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The Natural History of Selborne.

(VOL. II.)

BY

THE REV. GILBERT WHITE, A.M.

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THE

NATURAL HISTORY OF SELBORNE.

VOL. II.

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OF

SELBORNE

BY

THE REV. GILBERT WHITE, A.M.

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INTRODUCTION.

GILBERT WHITE'S home in the quiet Hampshire village of Selborne is an old family house that has grown by additions, and has roofs of nature's colouring, and creeping plants on walls that have not been driven by scarcity of ground to mount into the air. The house is larger, by a wing, now than when White lived in it. A little wooded park, that belongs to it, extends to a steep hill, "The Hanger," clothed with a hanging wood of beech. The Hanger and the slope of Nore Hill place the village in a pleasant shelter. A visit to Selborne can be made by a walk of a few miles from Alton on the South Western Railway. It is a country walk worth taking on its own account.

The name, perhaps, implies that the place is wholesome. It was a village in Anglo-Saxon times. Its borne or burn is a brook that has its spring at the head of the village, and "sel" meant prosperity or health of the best. It is the "sel" in the German "selig" and the "sil" in our "silly," which once represented in the best sense well-being of the innocent.

So our old poets talk of "seely sheep;" but as the guileless are apt prey to the guileful, silliness came to mean what "blessed innocence" itself now stands for in the language of men who, poor fellows, are very much more foolish. So Selborne has a happy old pastoral name. The fresh, full spring, called the "Well Head," which gives its name to Selborne, doubtless brought the village to its side by the constant water supply that it furnished. The rivulet becomes at Oakhanger a considerable stream.

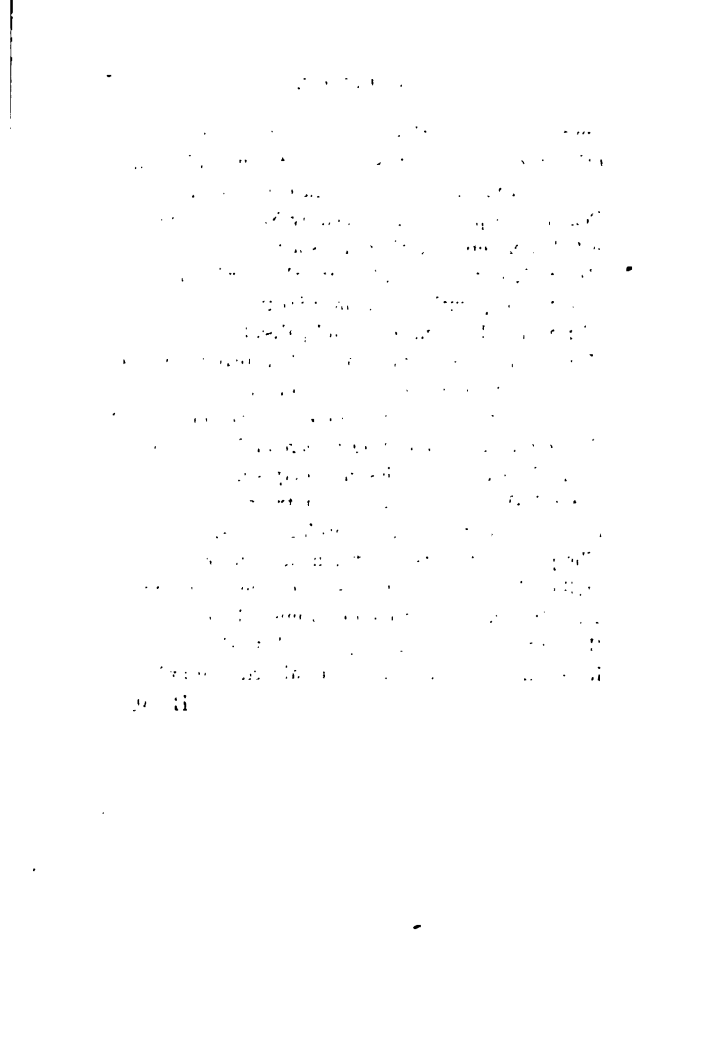
The Plestor, mentioned in the second letter as having once had a great oak in it which was blown down in the great storm of 1703—a storm of which Defoe collected the chief records into a book—bears witness also to the cheerful village life of old. The name is a corruption of Play-stow; it was the playground for the village children. That oak blown down in 1703, which the vicar of the time vainly endeavoured to root again, was said to have lived 432 years before the time of its overthrow. The old yew in the churchyard has escaped all storms.

Gilbert White wrote three or four pieces of verse. Of one of them, "An Invitation to Selborne," these are the closing lines:—

"Nor be the Parsonage by the Muse forgot;
The partial bard admires his native spot;

Smit with its beauties, loved, as yet a child,
(Unconscious why) its scapes grotesque and wild.
High on a mound th' exalted garden stands,
Beneath, deep valleys, scooped by Nature's hand.
A Cobham here, exulting in his art,
Might blend the General's with the Gardener's part;
Might fortify with all the martial trade
Of rampart, bastion, fosse, and palisade;
Might plant the mortar with wide threatening bore,
Or bid the mimic cannon seem to roar.
Now climb the steep, drop now your eye below,
Where round the blooming village orchards grow;
There, like a picture, lies my lowly seat,
A rural, sheltered, unobserved retreat.
Me, far above the rest, Selbornian scenes,
The pendent forests, and the mountain greens,
Strike with delight; there spreads the distant view,
That gradual fades till sunk in misty blue;
Here Nature hangs her slopy woods to sight,
Rills purl between, and dart a quivering light."

H. M.



THE NATURAL HISTORY OF SELBORNE.

LETTERS TO THE HON. DAINES BARRINGTON.

LETTER XV.

SELBORNE, *July 8th*, 1773.

DEAR SIR,—Some young men went down lately to a pond on the verge of Wolmer Forest to hunt flappers, or young wild-ducks, many of which they caught, and, among the rest, some very minute yet well-fledged wild-fowls alive, which upon examination I found to be teals. I did not know till then that teals ever bred in the south of England, and was much pleased with the discovery: this I look upon as a great stroke in natural history.

We have had, ever since I can remember, a pair of white owls that constantly breed under the eaves of this church. As I have paid good attention to the manner of life of these birds during their season of breeding, which lasts the summer through, the following remarks may not perhaps be unacceptable:—

About an hour before sunset (for then the mice begin to run) they sally forth in quest of prey, and hunt all round the hedges of meadows and small enclosures for them, which seem to be their only food. In this irregular country we can stand on an eminence and see them beat the fields over like a setting-dog, and often drop down in the grass or corn. I have minuted these birds with my watch for an hour together, and have found that they return to their nest, the one or the other of them, about once in five minutes; reflecting at the same time on the adroitness that every animal is possessed of as far as regards the well-being of itself and offspring. But a piece of address, which they show when they return loaded, should not, I think, be passed over in silence. As they take their prey with their claws, so they carry it in their claws to their nest; but, as the feet are necessary in their ascent under the tiles, they constantly perch first on the roof of the chancel, and shift the mouse from their claws to their bill, that their feet may be at liberty to take hold of the plate on the wall as they are rising under the eaves.

White owls seem not (but in this I am not positive) to hoot at all; all that clamorous hooting appears to me to come from the wood kinds. The white owl does indeed snore and hiss in a tremendous manner; and these menaces well answer the intention of intimidat-

ing; for I have known a whole village up in arms on such an occasion, imagining the churchyard to be full of goblins and spectres. White owls also often scream horribly as they fly along; from this screaming probably arose the common people's imaginary species of screech-owl, which they superstitiously think attends the windows of dying persons. The plumage of the remiges of the wings of every species of owl that I have yet examined is remarkably soft and pliant. Perhaps it may be necessary that the wings of these birds should not make much resistance or rushing, that they may be enabled to steal through the air unheard upon a nimble and watchful quarry.

While I am talking of owls, it may not be improper to mention what I was told by a gentleman of the county of Wilts. As they were grubbing a vast hollow pollard-ash that had been the mansion of owls for centuries, he discovered at the bottom a mass of matter that at first he could not account for. After some examination he found that it was a congeries of the bones of mice (and perhaps of birds and bats) that had been heaping together for ages, being cast up in pellets out of the crops of many generations of inhabitants. For owls cast up the bones, fur, and feathers, of what they devour, after the manner of hawks. He believes, he told me, that there were bushels of this kind of substance.

When brown owls hoot their throats swell as big as a hen's egg. I have known an owl of this species live a full year without any water. Perhaps the case may be the same with all birds of prey. When owls fly they stretch out their legs behind them as a balance to their large heavy heads, for as most nocturnal birds have large eyes and ears they must have large heads to contain them. Large eyes, I presume, are necessary to collect every ray of light, and large concave ears to command the smallest degree of sound or noise.

I am, etc.

[It will be proper to premise here that the sixteenth, eighteenth, twentieth, and twenty-first letters have been published already in the "Philosophical Transactions;" but as nicer observation has furnished several corrections and additions, it is hoped that the republication of them will not give offence; especially as these sheets would be very imperfect without them, and as they will be new to many readers who had no opportunity of seeing them when they made their first appearance.]

"The hirundines are a most inoffensive, harmless, entertaining, social, and useful tribe of birds; they touch no fruit in our gardens; delight, all except one species, in attaching themselves to our houses; amuse us with their migrations, songs, and marvellous agility; and clear our outlets from the annoyances of gnats and other troublesome insects. Some districts in the south

seas, near Guiaquil, are desolated, it seems, by the infinite swarms of venomous mosquitoes, which fill the air, and render those coasts insupportable. It would be worth inquiring whether any species of hirundines is found in those regions. Whoever contemplates the myriads of insects that sport in the sunbeams of a summer evening in this country, will soon be convinced to what a degree our atmosphere would be choked with them was it not for the friendly interposition of the swallow tribe.

"Many species of birds have their peculiar lice; but the hirundines alone seem to be annoyed with dipterous insects, which infest every species, and are so large, in proportion to themselves, that they must be extremely irksome and injurious to them. These are the *hippoboscæ hirundinis*, with narrow subulated wings, abounding in every nest; and are hatched by the warmth of the bird's own body during incubation, and crawl about under its feathers.

"A species of them is familiar to horsemen in the south of England under the name of forest-fly; and to some of side-fly, from its running sideways like a crab. It creeps under the tails, and about the groins, of horses, which, at their first coming out of the north, are rendered half frantic by the tickling sensation; while our own breed little regards them.

"The curious Reaumur discovered the large eggs,

or rather *pupæ*, of these flies as big as the flies themselves, which he hatched in his own bosom. Any person that will take the trouble to examine the old nests of either species of swallows may find in them the black shining cases or skins of the *pupæ* of these insects; but for other particulars, too long for this place, we refer the reader to 'L'Histoire d'Insectes' of that admirable entomologist. Tom. iv., pl. ii."

LETTER XVI.

SELBORNE, *Nov.* 20*th*, 1773.

DEAR SIR,—In obedience to your injunctions I sit down to give you some account of the house-martin, or martlet; and if my monography of this little domestic and familiar bird should happen to meet with your approbation, I may probably soon extend my inquiries to the rest of the British hirundines—the swallow, the swift, and the bank-martin.

A few house-martins begin to appear about the 16th April; usually some few days later than the swallow. For some time after they appear the hirundines in general pay no attention to the business of nidification, but play and sport about, either to recruit from the fatigue of their journey, if they do migrate at all, or

else that their blood may recover its true tone and texture after it has been so long benumbed by the severities of winter. About the middle of May, if the weather be fine, the martin begins to think in earnest of providing a mansion for its family. The crust or shell of this nest seems to be formed of such dirt or loam as comes most readily to hand, and is tempered and wrought together with little bits of broken straws to render it tough and tenacious. As this bird often builds against a perpendicular wall without any projecting ledge under, it requires its utmost efforts to get the first foundation firmly fixed, so that it may safely carry the superstructure. On this occasion the bird not only clings with its claws, but partly supports itself by strongly inclining its tail against the wall, making that a fulcrum; and thus steadied, it works and plasters the materials into the face of the brick or stone. But then, that this work may not, while it is soft and green, pull itself down by its own weight, the provident architect has prudence and forbearance enough not to advance her work too fast; but by building only in the morning, and by dedicating the rest of the day to food and amusement, gives it sufficient time to dry and harden. About half an inch seems to be a sufficient layer for a day. Thus careful workmen, when they build mud-walls (informed at first, perhaps, by this little bird), raise but a moderate

layer at a time, and then desist, lest the work should become top-heavy, and so be ruined by its own weight. By this method in about ten or twelve days is formed a hemispheric nest with a small aperture towards the top, strong, compact, and warm; and perfectly fitted for all the purposes for which it was intended. But then nothing is more common than for the house-sparrow, as soon as the shell is finished, to seize on it as its own, to eject the owner, and to line it after its own manner.

After so much labour is bestowed in erecting a mansion, as Nature seldom works in vain, martins will breed on for several years together in the same nest, where it happens to be well sheltered and secure from the injuries of weather. The shell or crust of the nest is a sort of rustic work, full of knobs and protuberances on the outside; nor is the inside of those that I have examined smoothed with any exactness at all; but is rendered soft and warm, and fit for incubation, by a lining of small straws, grasses, and feathers, and sometimes by a bed of moss interwoven with wool. In this nest they tread, or engender, frequently during the time of building; and the hen lays from three to five white eggs.

At first when the young are hatched, and are in a naked and helpless condition, the parent birds, with tender assiduity, carry out what comes away from

their young. Was it not for this affectionate cleanliness the nestlings would soon be burnt up, and destroyed in so deep and hollow a nest, by their own caustic excrement. In the quadruped creation the same neat precaution is made use of, particularly among dogs and cats, where the dams lick away what proceeds from their young. But in birds there seems to be a particular provision, that the dung of nestlings is enveloped in a tough kind of jelly, and therefore is the easier conveyed off without soiling or daubing. Yet, as nature is cleanly in all her ways, the young perform this office for themselves in a little time by thrusting their tails out at the aperture of their nest. As the young of small birds presently arrive at their ἡλικία, or full growth, they soon become impatient of confinement, and sit all day with their heads out at the orifice, where the dams, by clinging to the nest, supply them with food from morning to night. For a time the young are fed on the wing by their parents; but the feat is done by so quick and almost imperceptible a flight that a person must have attended very exactly to their motions before he would be able to perceive it. As soon as the young are able to shift for themselves, the dams immediately turn their thoughts to the business of a second brood; while the first flight, shaken off and rejected by their nurses, congregate in great flocks, and are the birds that are seen clustering

and hovering on sunny mornings and evenings round towers and steeples, and on the roofs of churches and houses. These congregatings usually begin to take place about the first week in August, and therefore we may conclude that by that time the first flight is pretty well over. The young of this species do not quit their abodes altogether; but the more forward birds get abroad some days before the rest. These approaching the eaves of buildings, and playing about before them, make people think that several old ones attend one nest. They are often capricious in fixing on a nesting-place, beginning many edifices, and leaving them unfinished; but when once a nest is completed in a sheltered place, it serves for several seasons. Those which breed in a ready finished house get the start in hatching of those that build new by ten days or a fortnight. These industrious artificers are at their labours in the long days before four in the morning. When they fix their materials they plaster them on with their chins, moving their heads with a quick vibratory motion. They dip and wash as they fly sometimes in very hot weather, but not so frequently as swallows. It has been observed that martins usually build to a north-east or north-west aspect, that the heat of the sun may not crack and destroy their nests; but instances are also remembered where they bred for many years in vast abundance

in a hot, stifled inn-yard against a wall facing to the south.

Birds in general are wise in their choice of situation; but in this neighbourhood every summer is seen a strong proof to the contrary at a house without eaves in an exposed district, where some martins build year by year in the corners of the windows. But, as the corners of these windows (which face to the south-east and south-west) are too shallow, the nests are washed down every hard rain; and yet these birds drudge on to no purpose from summer to summer, without changing their aspect or house. It is a piteous sight to see them labouring when half their nest is washed away and bringing dirt . . . . . "*generis lapsi sarcire ruinas.*" Thus is instinct a most wonderful unequal faculty; in some instances so much above reason, in other respects so far below it! Martins love to frequent towns, especially if there are great lakes and rivers at hand; nay, they even affect the close air of London. And I have not only seen them nesting in the Borough, but even in the Strand and Fleet Street; but then it was obvious from the dinginess of their aspect that their feathers partook of the filth of that sooty atmosphere. Martins are by far the least agile of the four species; their wings and tails are short, and therefore they are not capable of such surprising turns and quick and glancing evolutions as

the swallow. Accordingly they make use of a placid easy motion in a middle region of the air, seldom mounting to any great height, and never sweeping long together over the surface of the ground or water. They do not wander far for food, but affect sheltered districts, over some lake, or under some hanging wood, or in some hollow vale, especially in windy weather. They breed the latest of all the swallow kind: in 1772 they had nestlings on to October 21st, and are never without unfledged young as late as Michaelmas.

As the summer declines the congregating flocks increase in numbers daily by the constant accession of the second broods, till at last they swarm in myriads upon myriads round the villages on the Thames, darkening the face of the sky as they frequent the aits of that river, where they roost. They retire, the bulk of them, I mean, in vast flocks together about the beginning of October, but have appeared of late years in a considerable flight in this neighbourhood, for one day or two, as late as November 3rd and 6th, after they were supposed to have been gone for more than a fortnight. They therefore withdraw with us the latest of any species. Unless these birds are very short-lived indeed, or unless they do not return to the districts where they are bred, they must undergo vast devastations somehow and somewhere; for the birds

that return yearly bear no manner of proportion to the birds that retire.

House-martins are distinguished from their congenera by having their legs covered with soft downy feathers down to their toes. They are no songsters, but twitter in a pretty inward soft manner in their nests. During the time of breeding they are often greatly molested with fleas.

I am, etc.

LETTER XVII.

RINGMER, near LEWES, *Dec. 9th*, 1773.

DEAR SIR,—I received your last favour just as I was setting out for this place, and am pleased to find that my monography met with your approbation. My remarks are the result of many years' observation, and are, I trust, true in the whole, though I do not pretend to say that they are perfectly void of mistake, or that a more nice observer might not make many additions, since subjects of this kind are inexhaustible.

If you think my letter worthy the notice of your respectable society, you are at liberty to lay it before them, and they will consider it, I hope, as it was intended, as a humble attempt to promote a more minute inquiry into natural history, into the life and

conversation of animals. Perhaps, hereafter, I may be induced to take the house-swallow under consideration, and from that proceed to the rest of the British hirundines.

Though I have now travelled the Sussex Downs upwards of thirty years, yet I still investigate that chain of majestic mountains with fresh admiration year by year, and I think I see new beauties every time I traverse it. This range, which runs from Chichester eastward as far as East Bourn, is about sixty miles in length, and is called the South Downs, properly speaking, only round Lewes. As you pass along you command a noble view of the wild, or weald, on one hand, and the broad downs and sea on the other. My Ray used to visit a family just at the foot of these hills, and was so ravished with the prospect from Plumpton Plain, near Lewes, that he mentions those scapes in his "Wisdom of God in the Works of the Creation" with the utmost satisfaction, and thinks them equal to anything he had seen in the finest parts of Europe.

For my own part, I think there is somewhat peculiarly sweet and amusing in the shapely-figured aspect of chalk-hills in preference to those of stone, which are rugged, broken, abrupt, and shapeless.

Perhaps I may be singular in my opinion, and not so happy as to convey to you the same idea; but I never

contemplate these mountains without thinking I perceive somewhat analogous to growth in their gentle swellings and smooth fungus-like protuberances, their fluted sides, and regular hollows and slopes, that carry at once the air of vegetative dilation and expansion . . . . .

. . . . . Or was there ever a time when these immense masses of calcareous matter were thrown into fermentation by some adventitious moisture: were raised and leavened into such shapes by some plastic power: and so made to swell and heave their broad backs into the sky so much above the less animated clay of the wild below?

By what I can guess from the admeasurements of the hills that have been taken round my house, I should suppose that these hills surmount the wild at an average at about the rate of five hundred feet.

One thing is very remarkable as to the sheep: from the westward till you get to the river Adur all the flocks have horns, and smooth white faces, and white legs, and a hornless sheep is rarely to be seen; but as soon as you pass that river eastward, and mount Beeding Hill, all the flocks at once become hornless, or as they call them, poll-sheep; and have, moreover, black faces with a white tuft of wool on their foreheads, and speckled and spotted legs, so that you would think that the flocks of Laban were pasturing on one side of

the stream, and the variegated breed of his son-in-law Jacob were cantoned along on the other. And this diversity holds good respectively on each side from the valley of Bramber and Beeding to the eastward, and westward all the whole length of the downs. If you talk with the shepherds on this subject, they tell you that the case has been so from time immemorial; and smile at your simplicity if you ask them whether the situation of these two different breeds might not be reversed? However, an intelligent friend of mine near Chichester is determined to try the experiment; and has this autumn, at the hazard of being laughed at, introduced a parcel of black-faced hornless rams among his horned western ewes. The black-faced poll-sheep have the shortest legs and the finest wool.

As I had hardly ever before travelled these downs at so late a season of the year, I was determined to keep as sharp a look-out as possible so near the southern coast, with respect to the summer short-winged birds of passage. We make great inquiries concerning the withdrawing of the swallow kind, without examining enough into the causes why this tribe is never to be seen in winter; for, *entre nous*, the disappearing of the latter is more marvellous than that of the former, and much more unaccountable. The hirundines, if they please, are certainly capable of migration, and yet no doubt are often found in a torpid state; but redstarts,

nightingales, white-throats, black-caps, etc., are very ill provided for long flights; have never been once found, as I ever heard of, in a torpid state, and yet can never be supposed, in such troops, from year to year to dodge and elude the eyes of the curious and inquisitive, which from day to day discern the other small birds that are known to abide our winters. But, notwithstanding all my care, I saw nothing like a summer bird of passage; and what is more strange not one wheat-ear, though they abound so in the autumn as to be a considerable perquisite to the shepherds that take them; and though many are to be seen to my knowledge all the winter through in many parts of the south of England. The most intelligent shepherds tell me that some few of these birds appear on the downs in March, and then withdraw to breed probably in warrens and stone-quarries: now and then a nest is ploughed up in a fallow on the downs under a furrow, but it is thought a rarity. At the time of wheat-harvest they begin to be taken in great numbers; are sent for sale in vast quantities to Brightelmstone and Tunbridge; and appear at the tables of all the gentry that entertain with any degree of elegance. About Michaelmas they retire and are seen no more till March. Though the birds are, when in season, in great plenty on the south downs round Lewes, yet at East Bourn, which is the eastern extremity of those

downs, they abound much more. One thing is very remarkable, that though in the height of the season so many hundreds of dozens are taken, yet they never are seen to flock; and it is a rare thing to see more than three or four at a time; so that there must be a perpetual flitting and constant progressive succession. It does not appear that any wheat-ears are taken to the westward of Houghton Bridge, which stands on the river Arun.

I did not fail to look particularly after my new migration of ring-ousels, and to take notice whether they continued on the downs to this season of the year; as I had formerly remarked them in the month of October all the way from Chichester to Lewes wherever there were any shrubs and covert: but not one bird of this sort came within my observation. I only saw a few larks and whin-chats, some rooks, and several kites and buzzards.

About Midsummer a flight of cross-bills comes to the pine-groves about this house, but never makes any long stay.

The old tortoise, that I have mentioned in a former letter, still continues in this garden; and retired under ground about the 20th November, and came out again for one day on the 30th: it lies now buried in a wet swampy border under a wall facing to the south, and is enveloped at present in mud and mire!

Here is a large rookery round this house, the inhabitants of which seem to get their livelihood very easily; for they spend the greatest part of the day on their nest-trees when the weather is mild. These rooks retire every evening all the winter from this rookery, where they only call by the way, as they are going to roost in deep woods: at the dawn of day they always revisit their nest-trees, and are preceded a few minutes by a flight of daws, that act, as it were, as their harbingers.

I am, etc.

LETTER XVIII.

SELBORNE, *Jan. 29th*, 1774.

DEAR SIR,—The house-swallow, or chimney-swallow, is undoubtedly the first comer of all the British hirundines; and appears in general on or about 13th April, as I have remarked from many years' observation. Not but now and then a straggler is seen much earlier; and, in particular, when I was a boy I observed a swallow for a whole day together on a sunny warm Shrove Tuesday; which day could not fall out later than the middle of March, and often happened early in February.

It is worth remarking that these birds are seen first

about lakes and mill-ponds; and it is also very particular, that if these early visitors happen to find frost and snow, as was the case of the two dreadful springs of 1770 and 1771, they immediately withdraw for a time. A circumstance this much more in favour of hiding than migration; since it is much more probable that a bird should retire to its hybernaculum just at hand, than return for a week or two to warmer latitudes.

The swallow, though called the chimney-swallow, by no means builds altogether in chimneys, but often within barns and out-houses against the rafters; and so she did in Virgil's time:

> . . . . "Antè
> Garrula quàm tignis nidos suspendat hirundo."

In Sweden she builds in barns, and is called *ladu swala*, the barn swallow. Besides, in the warmer parts of Europe there are no chimneys to houses, except they are English-built: in these countries she constructs her nest in porches, and gateways, and galleries, and open halls.

Here and there a bird may affect some odd, peculiar place; as we have known a swallow build down the shaft of an old well, through which chalk had been formerly drawn up for the purpose of manure: but in general with us this *hirundo* breeds in chimneys, and

loves to haunt those stacks where there is a constant fire, no doubt for the sake of warmth. Not that it can subsist in the immediate shaft where there is a fire; but prefers one adjoining to that of the kitchen, and disregards the perpetual smoke of that funnel, as I have often observed with some degree of wonder.

Five or six or more feet down the chimney does this little bird begin to form her nest about the middle of May, which consists, like that of the house-martin, of a crust or shell composed of dirt or mud, mixed with short pieces of straw to render it tough and permanent; with this difference, that whereas the shell of the martin is nearly hemispheric, that of the swallow is open at the top, and like half a deep dish: this nest is lined with fine grasses and feathers, which are often collected as they float in the air.

Wonderful is the address which this adroit bird shows all day long in ascending and descending with security through so narrow a pass. When hovering over the mouth of the funnel, the vibrations of her wings acting on the confined air occasion a rumbling like thunder. It is not improbable that the dam submits to this inconvenient situation so low in the shaft, in order to secure her broods from rapacious birds, and particularly from owls, which frequently fall down chimneys, perhaps in attempting to get at these nestlings.

The swallow lays from four to six white eggs, dotted with red specks; and brings out her first brood about the last week in June, or the first week in July. The progressive method by which the young are introduced into life is very amusing: first, they emerge from the shaft with difficulty enough, and often fall down into the rooms below: for a day or so they are fed on the chimney-top, and then are conducted to the dead leafless bough of some tree, where, sitting in a row, they are attended with great assiduity, and may then be called *perchers*. In a day or two more they become *flyers*, but are still unable to take their own food; therefore they play about near the place where the dams are hawking for flies; and, when a mouthful is collected, at a certain signal given, the dam and the nestling advance, rising towards each other, and meeting at an angle; the young one all the while uttering such a little quick note of gratitude and complacency, that a person must have paid very little regard to the wonders of Nature that has not often remarked this feat.

The dam betakes herself immediately to the business of a second brood as soon as she is disengaged from her first; which at once associates with the first broods of house-martins; and with them congregates, clustering on sunny roofs, towers, and trees. This hirundo brings out her second brood towards the middle and end of August.

All the summer long is the swallow a most instructive pattern of unwearied industry and affection; for from morning to night, while there is a family to be supported, she spends the whole day in skimming close to the ground, and executing the most sudden turns and quick evolutions. Avenues, and long walks, under hedges, and pasture-fields, and mown meadows where cattle graze, are her delight, especially if there are trees interspersed; because in such spots insects most abound. When a fly is taken a smart snap from her bill is heard, resembling the noise at the shutting of a watch-case; but the motion of the mandibles is too quick for the eye.

The swallow, probably the male bird, is the *excubitor* to house-martins, and other little birds, announcing the approach of birds of prey. For as soon as a hawk appears, with a shrill alarming note he calls all the swallows and martins about him; who pursue in a body, and buffet and strike their enemy till they have driven him from the village, darting down from above on his back, and rising in a perpendicular line in perfect security. This bird also will sound the alarm, and strike at cats when they climb on the roofs of houses, or otherwise approach the nests. Each species of hirundo drinks as it flies along, sipping the surface of the water; but the swallow alone, in general, washes on the wing, by dropping into a pool for many times

together: in very hot weather house-martins and bank-martins dip and wash a little.

The swallow is a delicate songster, and in soft sunny weather sings both perching and flying: on trees in a kind of concert, and on chimney tops: is also a bold flyer, ranging to distant downs and commons even in windy weather, which the other species seem much to dislike; nay, even frequenting exposed seaport towns, and making little excursions over the salt water. Horsemen on wide downs are often closely attended by a little party of swallows for miles together, which plays before and behind them, sweeping around them, and collecting all the sculking insects that are roused by the trampling of the horses' feet: when the wind blows hard, without this expedient, they are often forced to settle to pick up their lurking prey.

This species feeds much on little *Coleoptera*, as well as on gnats and flies; and often settles on dug ground, or paths, for gravels to grind and digest its food. Before they depart, for some weeks, to a bird, they forsake houses and chimneys, and roost in trees; and usually withdraw about the beginning of October; though some few stragglers may appear on at times till the first week in November.

Some few pairs haunt the new and open streets of London next the fields, but do not enter, like the house-martin, the close and crowded parts of the city.

Both male and female are distinguished from their congeners by the length and forkedness of their tails. They are undoubtedly the most nimble of all the species: and when the male pursues the female in amorous chase they then go beyond their usual speed, and exert a rapidity almost too quick for the eye to follow.

After this circumstantial detail of the life and discerning στοργη of the swallow, I shall add, for your farther amusement, an anecdote or two not much in favour of her sagacity:—

A certain swallow built for two years together on the handles of a pair of garden-shears, that were stuck up against the boards in an out-house, and therefore must have her nest spoiled whenever that implement was wanted: and, what is stranger still, another bird of the same species built its nest on the wings and body of an owl, that happened by accident to hang dead and dry from the rafter of a barn. This owl, with the nest on its wings, and with eggs in the nest, was brought as a curiosity worthy the most elegant private museum in Great Britain. The owner, struck with the oddity of the sight, furnished the bringer with a large shell, or conch, desiring him to fix it just where the owl hung: the person did as he was ordered, and the following year a pair, probably the same pair, built their nest in the conch, and laid their eggs.

The owl and the conch make a strange grotesque

appearance, and are not the least curious specimens in that wonderful collection of art and nature.

Thus is instinct in animals, taken the least out of its way, an undistinguishing, limited faculty; and blind to every circumstance that does not immediately respect self-preservation, or lead at once to the propagation or support of their species.

I am, with all respect, etc., etc.

LETTER XIX.

SELBORNE, *Feb.* 14*th*, 1774.

DEAR SIR,—I received your favour of the 8th, and am pleased to find that you read my little history of the swallow with your usual candour; nor was I the less pleased to find that you made objections where you saw reason.

As to the quotations, it is difficult to say precisely which species of hirundo Virgil might intend in the lines in question, since the ancients did not attend to specific differences like modern naturalists; yet somewhat may be gathered, enough to incline me to suppose that in the two passages quoted the poet had his eye on the swallow.

In the first place the epithet *garrula* suits the

swallow well, who is a great songster, and not the martin, which is rather a mute bird; and when it sings is so inward as scarce to be heard. Besides, if *tignum* in that place signifies a rafter rather than a beam, as it seems to me to do, then I think it must be the swallow that is alluded to, and not the martin, since the former does frequently build within the roof against the rafters, while the latter always, as far as I have been able to observe, builds without the roof against eaves and cornices.

As to the simile, too much stress must not be laid on it, yet the epithet *nigra* speaks plainly in favour of the swallow, whose back and wings are very black, while the rump of the martin is milk-white, its back and wings blue, and all its under part white as snow. Nor can the clumsy motions (comparatively clumsy) of the martin well represent the sudden and artful evolutions and quick turns which Juturna gave to her brother's chariot, so as to elude the eager pursuit of the enraged Æneas. The verb *sonat* also seems to imply a bird that is somewhat loquacious.

We have had a very wet autumn and winter, so as to raise the springs to a pitch beyond anything since 1764, which was a remarkable year for floods and high waters. The land-springs which we call lavants, break out much on the downs of Sussex, Hampshire and Wiltshire. The country people say when the

lavants rise corn will always be dear; meaning that when the earth is so glutted with water as to send forth springs on the downs and uplands, that the corn-vales must be drowned; and so it has proved for these ten or eleven years past. For land-springs have never obtained more since the memory of man than during that period; nor has there been known a greater scarcity of all sorts of grain, considering the great improvements of modern husbandry. Such a run of wet seasons a century or two ago would, I am persuaded, have occasioned a famine. Therefore pamphlets and newspaper letters, that talk of combinations, tend to inflame and mislead; since we must not expect plenty till Providence sends us more favourable seasons.

The wheat of last year, all round this district, and in the county of Rutland, and elsewhere, yields remarkably bad, and our wheat on the ground, by the continual late sudden vicissitudes from fierce frost to pouring rains, looks poorly, and the turnips rot very fast.

I am, etc.

LETTER XX.

SELBORNE, *Feb.* 26*th*, 1774.

DEAR SIR,—The sand-martin, or bank-martin, is by much the least of any of the British hirundines, and as far as we have ever seen, the smallest known hirundo; though Brisson asserts that there is one much smaller, and that is the *hirundo esculenta*.

But it is much to be regretted that it is scarce possible for any observer to be so full and exact as he could wish in reciting the circumstances attending the life and conversation of this little bird, since it is *feræ naturæ*, at least in this part of the kingdom, disclaiming all domestic attachments, and haunting wild heaths and commons where there are large lakes; while the other species, especially the swallow and house-martin, are remarkably gentle and domesticated, and never seem to think themselves safe but under the protection of man.

Here are in this parish, in the sand-pits and banks of the lakes of Wolmer forest, several colonies of these birds, and yet they are never seen in the village, nor do they at all frequent the cottages that are scattered about in that wild district. The only instance I ever remember where this species haunts any building, is at the town of Bishop's Waltham, in this county, where

many sand-martins nestle and breed in the scaffold-holes of the back wall of William of Wykeham's stables; but then this wall stands in a very sequestered and retired enclosure, and faces upon a large and beautiful lake. And indeed this species seems so to delight in large waters, that no instance occurs of their abounding, but near vast pools or rivers; and in particular it has been remarked that they swarm in the banks of the Thames in some places below London-bridge.

It is curious to observe with what different degrees of architectonic skill Providence has endowed birds of the same genus, and so nearly correspondent in their general mode of life; for while the swallow and the house-martin discover the greatest address in raising and securely fixing crusts or shells of loam as cunabula for their young, the bank-martin terebrates a round and regular hole in the sand or earth, which is serpentine, horizontal, and about two feet deep. At the inner end of this burrow does this bird deposit, in a good degree of safety, her rude nest, consisting of fine grasses and feathers, usually goose-feathers, very inartificially laid together.

Perseverance will accomplish anything; though at first one would be disinclined to believe that this weak bird, with her soft and tender bill and claws, should ever be able to bore the stubborn sand-bank without

entirely disabling herself; yet with these feeble instruments have I seen a pair of them make great despatch, and could remark how much they had scooped that day, by the fresh sand which ran down the bank, and was of a different colour from that which lay loose and bleached in the sun.

In what space of time these little artists are able to mine and finish these cavities I have not been able to discover, for reasons given above; but it would be a matter worthy of observation, where it falls in the way of any naturalist to make his remarks. This I have often taken notice of, that several holes of different depths are left unfinished at the end of summer. To imagine that these beginnings were intentionally made in order to be in the greater forwardness for next spring, is allowing perhaps too much foresight and *rerum prudentia* to a simple bird. May not the cause of these *latebræ* being left unfinished arise from their meeting in these places with strata too harsh, hard, and solid, for their purpose, which they relinquish, and go to a fresh spot that works more freely? Or may they not in other places fall in with a soil as much too loose and mouldering, liable to flounder, and threatening to overwhelm them and their labours?

One thing is remarkable—that, after some years, the old holes are forsaken and new ones bored; perhaps because the old habitations grew foul and fetid from

long use, or because they may so abound with fleas as to become untenantable. This species of swallow, moreover, is strangely annoyed with fleas; and we have seen fleas, bed-fleas (*pulex irritans*), swarming at the mouths of these holes, like bees on the stools of their hives.

The following circumstance should by no means be omitted—that these birds do not make use of their caverns by way of hybernacula, as might be expected; since banks so perforated have been dug out with care in the winter, when nothing was found but empty nests.

The sand-martin arrives much about the same time with the swallow, and lays, as she does, from four to six white eggs. But as this species is *cryptogame*, carrying on the business of nidification, incubation, and the support of its young in the dark, it would not be so easy to ascertain the time of breeding, were it not for the coming forth of the broods, which appear much about the time, or rather somewhat earlier than those of the swallow. The nestlings are supported in common like those of their congeners, with gnats and other small insects, and sometimes they are fed with *libellulæ* (dragon-flies) almost as long as themselves. In the last week in June we have seen a row of these sitting on a rail near a great pool as perchers, and so young and helpless, as easily to be taken by hand; but

whether the dams ever feed them on the wing, as swallows and house-martins do, we have never yet been able to determine, nor do we know whether they pursue and attack birds of prey.

When they happen to breed near hedges and enclosures, they are dispossessed of their breeding holes by the house-sparrow, which is on the same account a fell adversary to house-martins.

These hirundines are no songsters, but rather mute, making only a little, harsh noise when a person approaches their nest. They seem not to be of a sociable turn, never with us congregating with their congeners in the autumn. Undoubtedly they breed a second time, like the house-martin and swallow; and withdraw about Michaelmas.

Though in some particular districts they may happen to abound, yet in the whole, in the south of England at least, is this much the rarest species. For there are few towns or large villages but what abound with house-martins; few churches, towers, or steeples, but what are haunted by some swifts; scarce a hamlet or single cottage chimney that has not its swallow; while the bank-martins, scattered here and there, live a sequestered life among some abrupt sand-hills, and in the banks of some few rivers.

These birds have a peculiar manner of flying; flitting about with odd jerks, and vacillations, not unlike the

motions of a butterfly. Doubtless the flight of all hirundines is influenced by, and adapted to, the peculiar sort of insects which furnish their food. Hence it would be worth inquiry to examine what particular genus of insects affords the principal food of each respective species of swallow.

Notwithstanding what has been advanced above, some few sand-martins, I see, haunt the skirts of London, frequenting the dirty pools in Saint George's Fields, and about Whitechapel. The question is where these build, since there are no banks or bold shores in that neighbourhood; perhaps they nestle in the scaffold holes of some old or new deserted building. They dip and wash as they fly sometimes, like the house-martin and swallow.

Sand-martins differ from their congeners in the diminutiveness of their size, and in their colour, which is what is usually called a mouse-colour. Near Valencia, in Spain, they are taken, says Willughby, and sold in the markets for the table; and are called by the country people, probably from their desultory jerking manner of flight, *Papilion de Montagna*.

LETTER XXI.

SELBORNE, *Sept.* 28*th*, 1774.

DEAR SIR,—As the swift or black-martin is the largest of the British *hirundines*, so it is undoubtedly the latest comer. For I remember but one instance of its appearing before the last week in April; and in some of our late frosty, harsh springs, it has not been seen till the beginning of May. This species usually arrives in pairs.

The swift, like the sand-martin, is very defective in architecture, making no crust, or shell, for its nest; but forming it of dry grasses and feathers, very rudely and inartificially put together. With all my attention to these birds, I have never been able once to discover one in the act of collecting or carrying in materials; so that I have suspected (since their nests are exactly the same) that they sometimes usurp upon the house-sparrows, and expel them, as sparrows do the house and sand-martin; well remembering that I have seen them squabbling together at the entrance of their holes, and the sparrows up in arms, and much disconcerted at these intruders. And yet I am assured, by a nice observer in such matters, that they do collect feathers for their nests in Andalusia, and that he has shot them with such materials in their mouths.

Swifts, like sand-martins, carry on the business of nidification quite in the dark, in crannies of castles, and towers, and steeples, and upon the tops of the walls of churches under the roof; and therefore cannot be so narrowly watched as those species that build more openly; but, from what I could ever observe, they begin nesting about the middle of May; and I have remarked, from eggs taken, that they have sat hard by the 9th June. In general they haunt tall buildings, churches, and steeples, and breed only in such; yet in this village some pairs frequent the lowest and meanest cottages, and educate their young under those thatched roofs. We remember but one instance where they breed out of buildings, and that is in the sides of a deep chalk-pit near the town of Odiham, in this county, where we have seen many pairs entering the crevices, and skimming and squeaking round the precipices.

As I have regarded these amusive birds with no small attention, if I should advance something new and peculiar with respect to them, and different from all other birds, I might perhaps be credited; especially as my assertion is the result of many years' exact observation. The fact that I would advance is, that swifts tread, or propagate, on the wing; and I would wish any nice observer, that is startled at this supposition, to use his own eyes, and I think he will soon be convinced. In another class of animals, viz. the insect, nothing is

so common as to see the different species of many genera in conjunction as they fly. The swift is almost continually on the wing; and as it never settles on the ground, on trees, or roofs, would seldom find opportunity for amorous rites, was it not enabled to indulge them in the air. If any person would watch these birds of a fine morning in May, as they are sailing round at a great height from the ground, he would see every now and then, one drop on the back of another, and both of them sink down together for many fathoms with a loud piercing shriek. This I take to be the juncture when the business of generation is carrying on. As the swift eats, drinks, collects materials for its nest, and, as it seems, propagates on the wing, it appears to live more in the air than any other bird, and to perform all functions there save those of sleeping and incubation.

This hirundo differs widely from its congeners in laying invariably but two eggs at a time, which are milk-white, long, and peaked at the small end; whereas the other species lay at each brood from four to six. It is a most alert bird, rising very early, and retiring to roost very late; and is on the wing in the height of summer at least sixteen hours. In the longest days it does not withdraw to rest till a quarter before nine in the evening, being the latest of all day-birds: just before they retire whole groups of them assemble high

in the air, and squeak, and shoot about with wonderful rapidity. But this bird is never so much alive as in sultry thundery weather, when it expresses great alacrity, and calls forth all its powers. In hot mornings several, getting together in little parties, dash round the steeples and churches, squeaking as they go in a very clamorous manner; these, by nice observers, are supposed to be males serenading their sitting hens; and not without reason, since they seldom squeak till they come close to the walls or eaves, and since those within utter at the same time a little inward note of complacency. . . . . .

When the hen has sat hard all day, she rushes forth just as it is almost dark, and stretches and relieves her weary limbs, and snatches a scanty meal for a few minutes, and then returns to her duty of incubation. Swifts, when wantonly and cruelly shot while they have young, discover a little lump of insects in their mouths, which they pouch and hold under their tongue. In general they feed in a much higher district than the other species—a proof that gnats and other insects do also abound to a considerable height in the air; they also range to vast distances, since locomotion is no labour to them, who are endowed with such wonderful powers of wing. Their powers seem to be in proportion to their levers, and their wings are longer in proportion than those of almost any other bird. When

they mute, or ease themselves in flight, they raise their wings, and make them meet over their backs.

At some certain times in the summer I had remarked that swifts were hawking very low for hours together over pools and streams, and could not help inquiring into the object of their pursuit that induced them to descend so much below their usual range. After some trouble, I found that they were taking *phryganeæ*, *ephemeræ*, and *libellulæ* (cadew-flies, may-flies, and dragon-flies), that were just emerged out of their aurelia state. I then no longer wondered that they should be so willing to stoop for a prey that afforded them such plentiful and succulent nourishment.

They bring out their young about the middle or latter end of July: but as these never become perchers, nor, that ever I could discern, are fed on the wing by their dams, the coming forth of the young is not so notorious as in the other species.

On the 30th of last June I untiled the eaves of a house where many pairs build, and found in each nest only two squab, naked *pulli*; on the 9th July I repeated the same inquiry, and found that they had made very little progress towards a fledged state, but were still naked and helpless. From whence we may conclude that birds whose way of life keeps them perpetually on the wing would not be able to quit their nest till the end of the month. Swallows and martins,

that have numerous families, are continually feeding them every two or three minutes, while swifts, that have but two young to maintain, are much at their leisure, and do not attend on their nest for hours together.

Sometimes they pursue and strike at hawks that come in their way, but not with that vehemence and fury that swallows express on the same occasion. They are out all day long in wet days, feeding about, and disregarding still rain: from whence two things may be gathered; first, that many insects abide high in the air, even in rain; and next, that the feathers of these birds must be well greased to resist so much wet. Windy, and particularly windy weather with heavy showers, they dislike, and on such days withdraw, and are scarce ever seen.

There is a circumstance respecting the colour of swifts which seems not to be unworthy of our attention. When they arrive in the spring, they are all over of a glossy, dark soot-colour, except their chins, which are white; but, by being all day long in the sun and air, they become quite weather-beaten and bleached before they depart, and yet they return glossy again in the spring. Now, if they pursue the sun into lower latitudes, as some suppose, in order to enjoy a perpetual summer, why do they not return bleached? Do they not rather perhaps retire to rest for a season, and

at that juncture moult and change their feathers, since all other birds are known to moult soon after the season of breeding?

Swifts are very anomalous in many particulars, dissenting from all their congeners not only in the number of their young, but in breeding but once in a summer, whereas all the other British hirundines breed invariably twice. It is past all doubt that swifts can breed but once, since they withdraw in a short time after the flight of their young, and some time before their congeners bring out their second broods. We may here remark that, as swifts breed but once in a summer, and only two at a time, and the other hirundines twice, the latter, who lay from four to six eggs, increase at an average five times as fast as the former.

But in nothing are swifts more singular than in their early retreat. They retire, as to the main body of them, by the 10th August, and sometimes a few days sooner; and every straggler invariably withdraws by the 20th, while their congeners, all of them, stay till the beginning of October—many of them all through that month, and some occasionally to the beginning of November. This early retreat is mysterious and wonderful, since that time is often the sweetest season in the year. But what is more extraordinary, they begin to retire still earlier in the most southerly parts of Andalusia, where they can be

in no ways influenced by any defect of heat, or, as one might suppose, failure of food. Are they regulated in their motions with us by a defect of food, or by a propensity to moulting, or by a disposition to rest after so rapid a life, or by what? This is one of those incidents in natural history that not only baffles our searches, but almost eludes our guesses!

These hirundines never perch on trees or roofs, and so never congregate with their congeners. They are fearless while haunting their nesting-places, and are not to be scared with a gun, and are often beaten down with poles and cudgels as they stoop to go under the eaves. Swifts are much infested with those pests to the genus called *hippobosca*: *hirundinis*; and often wriggle and scratch themselves in their flight to get rid of that clinging annoyance.

Swifts are no songsters, and have only one harsh screaming note; yet there are ears to which it is not displeasing, from an agreeable association of ideas, since that note never occurs but in the most lovely summer weather.

They never can settle on the ground but through accident, and, when down, can hardly rise, on account of the shortness of their legs and the length of their wings; neither can they walk, but only crawl; but they have a strong grasp with their feet, by which they cling to walls. Their bodies being flat they can

enter a very narrow crevice; and where they cannot pass on their bellies they will turn up edgewise.

The particular formation of the foot discriminates the swift from all the British hirundines; and, indeed from all other known birds, the *hirundo melba*, or great white-bellied swift of Gibraltar, excepted; for it is so disposed as to carry "*omnes quatuor digitos anticos*"—all its four toes forward; besides, the least toe, which should be the back toe, consists of one bone alone, and the other three only of two apiece,—a construction most rare and peculiar, but nicely adapted to the purposes in which their feet are employed. This and some peculiarities attending the nostrils and under mandible have induced a discerning naturalist to suppose that this species might constitute a genus *per se*.

In London, a party of swifts frequents the Tower, playing and feeding over the river just below the bridge; others haunt some of the churches of the Borough, next the fields, but do not venture, like the house-martin, into the close crowded part of the town.

The Swedes have bestowed a very pertinent name on this swallow, calling it "ring swala," from the perpetual rings or circles that it takes round the scene of its nidification.

Swifts feed on *coleoptera*, or small beetles with hard cases over their wings, as well as on the softer insects,

but it does not appear how they can procure gravel to grind their food, as swallows do, since they never settle on the ground. Young ones, over-run with *hippoboscæ*, are sometimes found under their nests, fallen to the ground, the number of vermin rendering their abode insupportable any longer. They frequent in this village several abject cottages; yet a succession still haunts the same unlikely roofs—a good proof this that the same birds return to the same spots. As they must stoop very low to get up under these humble eaves, cats lie in wait, and sometimes catch them on the wing.

On July 5th, 1775, I again unrilled part of a roof over the nest of a swift. The dam sat in the nest, but so strongly was she affected by natural *στοργή* for her brood, which she supposed to be in danger, that, regardless of her own safety, she would not stir, but lay sullenly by them, permitting herself to be taken in hand. The squab young we brought down and placed on the grass-plot, where they tumbled about, and were as helpless as a new-born child. While we contemplated their naked bodies, their unwieldy disproportioned abdomina, and their heads, too heavy for their necks to support, we could not but wonder when we reflected that these shiftless beings in a little more than a fortnight would be able to dash through the air almost with the inconceivable swiftness of a meteor,

and perhaps in their emigration must traverse vast continents and oceans as distant as the equator. So soon does Nature advance small birds to their ἥλικία, or state of perfection, while the progressive growth of men and large quadrupeds is slow and tedious?

I am, etc.

LETTER XXII.

SELBORNE, *Sept.* 12*th*, 1774.

DEAR SIR,—By means of a straight cottage chimney I had an opportunity this summer of remarking, at my leisure, how swallows ascend and descend through the shaft; but my pleasure in contemplating the address with which this feat was performed to a considerable depth in the chimney was somewhat interrupted by apprehensions lest my eyes might undergo the same fate with those of Tobit.

Perhaps it may be some amusement to you to hear at what times the different species of hirundines arrived this spring in three very distant counties of this kingdom. With us the swallow was seen first on April 4th, the swift on April 24th, the bank-martin on April 12th, and the house-martin not till April 30th. At South Zele, Devonshire, swallows did not arrive till April 25th, swifts in plenty on May 1st, and

house-martins not till the middle of May. At Blackburn, in Lancashire, swifts were seen April 28th, swallows April 29th, house-martins May 1st. Do these different dates, in such distant districts, prove anything for or against migration?

A farmer near Weyhill fallows his land with two teams of asses, one of which works till noon, and the other in the afternoon. When these animals have done their work, they are penned all night, like sheep, on the fallow. In the winter they are confined and foddered in a yard, and make plenty of dung.

Linnæus says that hawks "*paciscuntur induvia avium, quamdiu cuculus cuculat*;" but it appears to me that during that period many little birds are taken and destroyed by birds of prey, as may be seen by their feathers left in lanes and under hedges.

The missel-thrush is, while breeding, fierce and pugnacious, driving such birds as approach its nest with great fury to a distance. The Welsh call it "pen y llwyn," the head or master of the coppice. He suffers no magpie, jay, or blackbird, to enter the garden where he haunts, and is, for the time, a good guard to the new-sown legumens. In general he is very successful in the defence of his family; but once I observed in my garden that several magpies came determined to storm the nest of a missel-thrush: the

dams defended their mansion with great vigour, and fought resolutely *pro aris et focis*; but numbers at last prevailed, they tore the nest to pieces, and swallowed the young alive.

In the season of nidification the wildest birds are comparatively tame. Thus the ring-dove breeds in my fields, though they are continually frequented; and the missel-thrush, though most shy and wild in the autumn and winter, builds in my garden close to a walk where people are passing all day long.

Wall-fruit abounds with me this year; but my grapes, that used to be forward and good, are at present backward beyond all precedent; and this is not the worst of the story; for the same ungenial weather, the same black cold solstice, has injured the more necessary fruits of the earth, and discoloured and blighted our wheat. The crop of hops promises to be very large.

Frequent returns of deafness incommode me sadly, and half disqualify me for a naturalist; for, when those fits are upon me, I lose all the pleasing notices and little intimations arising from rural sounds; and May is to me as silent and mute with respect to the notes of birds, etc., as August. My eyesight is, thank God, quick and good; but with respect to the other sense, I am, at times, disabled:

"And Wisdom at one entrance quite shut out."

LETTER XXIII.

SELBORNE, *June 8th*, 1775.

DEAR SIR,—On September 21st, 1741, being then on a visit, and intent on field-diversions, I rose before day-break: when I came into the enclosures, I found the stubbles and clover-grounds matted all over with a thick coat of cobweb, in the meshes of which a copious and heavy dew hung so plentifully that the whole face of the country seemed, as it were, covered with two or three setting-nets drawn one over another. When the dogs attempted to hunt, their eyes were so blinded and hoodwinked that they could not proceed, but were obliged to lie down and scrape the incumbrances from their faces with their fore-feet, so that, finding my sport interrupted, I returned home musing in my mind on the oddness of the occurrence.

As the morning advanced the sun became bright and warm, and the day turned out one of those most lovely ones which no season but the autumn produces; cloudless, calm, serene, and worthy of the South of France itself.

About nine an appearance very unusual began to demand our attention, a shower of cobwebs falling from very elevated regions, and continuing, without any interruption, till the close of the day. These webs were not single filmy threads, floating in the air in all

directions, but perfect flakes or rags; some near an inch broad, and five or six long, which fell with a degree of velocity that showed they were considerably heavier than the atmosphere.

On every side as the observer turned his eyes might he behold a continual succession of fresh flakes falling into his sight, and twinkling like stars as they turned their sides towards the sun.

How far this wonderful shower extended would be difficult to say; but we know that it reached Bradley, Selborne, and Alresford, three places which lie in a sort of a triangle, the shortest of whose sides is about eight miles in extent.

At the second of those places there was a gentleman (for whose veracity and intelligent turn we have the greatest veneration) who observed it the moment he got abroad; but concluded that, as soon as he came upon the hill above his house, where he took his morning rides, he should be higher than this meteor which he imagined might have been blown, like thistle down, from the common above; but, to his great astonishment, when he rode to the most elevated part of the down, three hundred feet above his fields, he found the webs in appearance still as much above him as before; still descending into sight in a constant succession, and twinkling in the sun, so as to draw the attention of the most incurious.

Neither before nor after was any such fall observed; but on this day the flakes hung in the trees and hedges so thick that a diligent person sent out might have gathered baskets full.

The remark that I shall make on these cobweb-like appearances, called gossamer, is, that, strange and superstitious as the notions about them were formerly, nobody in these days doubts but that they are the real production of small spiders, which swarm in the fields in fine weather in autumn, and have a power of shooting out webs from their tails so as to render themselves buoyant, and lighter than air. But why these apterous insects should that day take such a wonderful aërial excursion, and why their webs should at once become so gross and material as to be considerably more weighty than air, and to descend with precipitation, is a matter beyond my skill. If I might be allowed to hazard a supposition, I should imagine that those filmy threads, when first shot, might be entangled in the rising dew, and so drawn up, spiders and all, by a brisk evaporation, into the regions where clouds are formed; and if the spiders have a power of coiling and thickening their webs in the air, as Dr. Lister says they have [see his Letters to Mr. Ray], then, when they were become heavier than the air, they must fall.

Every day in fine weather, in autumn chiefly, do I

see those spiders shooting out their webs and mounting aloft: they will go off from your finger if you will take them into your hand. Last summer one alighted on my book as I was reading in the parlour; and, running to the top of the page, and shooting out a web, took its departure from thence. But what I most wondered at was, that it went off with considerable velocity in a place where no air was stirring; and I am sure that I did not assist it with my breath. So that these little crawlers seem to have, while mounting, some locomotive power without the use of wings, and to move in the air faster than the air itself.

LETTER XXIV.

SELBORNE, *Aug.* 15th, 1775.

DEAR SIR,—There is a wonderful spirit of sociality in the brute creation, independent of sexual attachment: the congregating of gregarious birds in the winter is a remarkable instance.

Many horses, though quiet with company, will not stay one minute in a field by themselves: the strongest fences cannot restrain them. My neighbour's horse will not only not stay by himself abroad, but he will not bear to be left alone in a strange stable without

discovering the utmost impatience, and endeavouring to break the rack and manger with his fore feet. He has been known to leap out at a stable-window, through which dung was thrown, after company; and yet in other respects is remarkably quiet. Oxen and cows will not fatten by themselves; but will neglect the finest pasture that is not recommended by society. It would be needless to instance sheep, which constantly flock together.

But this propensity seems not to be confined to animals of the same species; for we know a doe, still alive, that was brought up from a little fawn with a dairy of cows; with them it goes a-field, and with them it returns to the yard. The dogs of the house take no notice of this deer, being used to her; but, if strange dogs come by, a chase ensues; while the master smiles to see his favourite securely leading her pursuers over hedge, or gate, or stile, till she returns to the cows, who, with fierce lowings and menacing horns, drive the assailants quite out of the pasture.

Even great disparity of kind and size does not always prevent social advances and mutual fellowship. For a very intelligent and observant person has assured me that, in the former part of his life, keeping but one horse, he happened also on a time to have but one solitary hen. These two incongruous animals spent much of their time together in a lonely orchard, where

they saw no creature but each other. By degrees an apparent regard began to take place between these two sequestered individuals. The fowl would approach the quadruped with notes of complacency, rubbing herself gently against his legs; while the horse would look down with satisfaction, and move with the greatest caution and circumspection, lest he should trample on his diminutive companion. Thus, by mutual good offices, each seemed to console the vacant hours of the other: so that Milton, when he puts the following sentiment in the mouth of Adam, seems to be somewhat mistaken:

"Much less can *bird* with *beast*, or fish with fowl,
So well converse, nor with the ox the ape."

I am, etc.

LETTER XXV.

SELBORNE, *Oct. 2nd*, 1775.

DEAR SIR,—We have two gangs or hordes of gypsies which infest the south and west of England, and come round in their circuit two or three times in the year. One of these tribes calls itself by the noble name of Stanley, of which I have nothing particular to say; but the other is distinguished by an appellative somewhat remarkable. As far as their harsh gibberish can

be understood, they seem to say that the name of their clan is Carleople; now the termination of this word is apparently Grecian, and as Mezeray and the gravest historians all agree that these vagrants did certainly migrate from Egypt and the East, two or three centuries ago, and so spread by degrees over Europe, may not this family-name, a little corrupted, be the very name they brought with them from the Levant? It would be matter of some curiosity, could one meet with an intelligent person among them, to inquire whether, in their jargon, they still retain any Greek words; the Greek radicals will appear in hand, foot, head, water, earth, etc. It is possible that amidst their cant and corrupted dialect many mutilated remains of their native language might still be discovered.

With regard to those peculiar people, the gypsies, one thing is very remarkable, and especially as they came from warmer climates; and that is, that while other beggars lodge in barns, stables, and cow-houses, these sturdy savages seem to pride themselves in braving the severities of winter, and in living *sub dio* the whole year round. Last September was as wet a month as ever was known; and yet during those deluges did a young gipsy girl lie in the midst of one of our hop-gardens, on the cold ground, with nothing over her but a piece of a blanket extended on a few hazel-rods bent hoop-fashion, and stuck into the earth

at each end, in circumstances too trying for a cow in the same condition; yet within this garden there was a large hop-kiln, into the chambers of which she might have retired, had she thought shelter an object worthy her attention.

Europe itself, it seems, cannot set bounds to the rovings of these vagabonds; for Mr. Bell, in his return from Peking, met a gang of those people on the confines of Tartary, who were endeavouring to penetrate those deserts, and try their fortune in China.

Gypsies are called in French, Bohemians; in Italian and modern Greek, Zingari.

I am, etc.

LETTER XXVI.

SELBORNE, *Nov.* 1st, 1775.

"Hic ter centenos, ille quater pingues, his plurimus igne
Semper, et assidua postes fuligine nigri."

DEAR SIR,—I shall make no apology for troubling you with the detail of a very single piece of domestic economy, being satisfied that you think nothing beneath your attention that tends to utility: the matter alluded to is the use of rushes instead of candles, which I am well aware prevails in many districts besides this; but as I know there are equestrians also where it

does not obtain, and as I have considered the subject with some degree of exactness. I shall proceed in my humble story, and leave you to judge of the expediency.

The proper species of rush for this purpose seems to be the *juncus effusus*, or common soft rush, which is to be found in most moist pastures, by the sides of streams, and under hedges. These rushes are in best condition in the height of summer; but may be gathered, so as to serve the purpose well, quite on to autumn. It would be needless to add that the largest and longest are best. Decayed labourers, women, and children, make it their business to procure and prepare them. As soon as they are cut, they must be flung into water, and kept there, for otherwise they will dry and shrink, and the peel will not run. At first a person would find it no easy matter to divest a rush of its peel or rind, so as to leave one regular, narrow, even rib from top to bottom that may support the pith; but this, like other feats, soon becomes familiar, even to children; and we have seen an old woman, stone blind, performing this business with great despatch, and seldom failing to strip them with the nicest regularity. When these *juncí* are thus far prepared, they must lie out on the grass to be bleached, and take the dew for some nights, and afterwards be dried in the sun.

Some address is required in dipping these rushes in the scalding fat or grease; but this knack also is to

be attained by practice. The careful wife of an industrious Hampshire labourer obtains all her fat for nothing; for she saves the scummings of her bacon-pot for this use; and, if the grease abounds with salt, she causes the salt to precipitate to the bottom, by setting the scummings in a warm oven. Where hogs are not much in use, and especially by the seaside, the coarser animal-oils will come very cheap. A pound of common grease may be procured for fourpence, and about six pounds of grease will dip a pound of rushes, and one pound of rushes may be bought for one shilling; so that a pound of rushes medicated and ready for use, will cost three shillings. If men that keep bees will mix a little wax with the grease, it will give it a consistency, and render it more cleanly, and make the rushes burn longer; mutton-suet would have the same effect.

A good rush, which measured in length two feet four inches and a half, being minuted, burnt only three minutes short of an hour; and a rush of still greater length has been known to burn one hour and a quarter.

These rushes give a good clear light. Watch-lights (coated with tallow), it is true, shed a dismal one, "darkness visible;" but then the wick of those have two ribs of the rind, or peel, to support the pith, while the wick of the dipped rush has but one. The two

ribs are intended to impede the progress of the flame and make the candle last.

In a pound of dry rushes, avoirdupois, which I caused to be weighed and numbered, we found upwards of one thousand six hundred individuals. Now suppose each of these burns, one with another, only half an hour, then a poor man will purchase eight hundred hours of light, a time exceeding thirty-three entire days, for three shillings. According to this account each rush, before dipping costs $\frac{1}{35}$ of a farthing, and $\frac{1}{11}$ afterwards. Thus a poor family will enjoy five and a half hours of comfortable light for a farthing. An experienced old housekeeper assures me that one pound and a half of rushes completely supplies his family the year round, since working people burn no candles in the long days, because they rise and go to bed by daylight.

Little farmers use rushes much in the short days, both morning and evening, in the dairy and kitchen; but the very poor, who are always the worst economists, and therefore must continue very poor, buy a halfpenny candle every evening, which in their blowing open rooms does not burn much more than two hours. Thus have they only two hours' light for their money instead of eleven.

While on the subject of rural economy, it may not be improper to mention a pretty implement of house-

wifery that we have seen nowhere else; that is, little neat besoms which our foresters make from the stalks of the *polytricum commune*, or great golden maiden-hair, which they call silk-wood, and find plenty in the bogs. When this moss is well combed and dressed, and divested of its outer skin, it becomes of a beautiful bright-chestnut colour; and, being soft and pliant, is very proper for the dusting of beds, curtains, carpets, hangings, etc. If these besoms were known to the brushmakers in town, it is probable they might come much in use for the purpose above mentioned.

I am, etc.

LETTER XXVII.

SELBORNE, *Dec.* 12*th*, 1775.

DEAR SIR,—We had in this village more than twenty years ago an idiot boy, whom I well remember, who, from a child, showed a strong propensity to bees; they were his food, his amusement, his sole object. And as people of this caste have seldom more than one point in view, so this lad exerted all his few faculties on this one pursuit. In the winter he dozed away his time, within his father's house, by the fireside, in a

kind of torpid state, seldom departing from the chimney-corner; but in the summer he was all alert, and in quest of his game in the fields, and on sunny banks. Honey-bees, humble-bees, and wasps, were his prey wherever he found them; he had no apprehensions from their stings, but would seize them *nudis manibus*, and at once disarm them of their weapons, and suck their bodies for the sake of their honey-bags. Sometimes he would fill his bosom between his shirt and his skin with a number of these captives, and sometimes would confine them in bottles. He was a very *merops apiaster*, or bee-bird, and very injurious to men that kept bees; for he would slide into their bee-gardens, and, sitting down before the stools, would rap with his finger on the hives, and so take the bees as they came out. He has been known to overturn hives for the sake of honey, of which he was passionately fond. Where metheglin was making he would linger round the tubs and vessels, begging a draught of what he called bee-wine. As he ran about he used to make a humming noise with his lips, resembling the buzzing of bees. This lad was lean and sallow, and of a cadaverous complexion; and, except in his favourite pursuit, in which he was wonderfully adroit, discovered no manner of understanding. Had his capacity been better, and directed to the same object, he had perhaps abated much of our wonder at

the feats of a more modern exhibitor of bees, and we may justly say of him now,—

"Thou [illegible]
Had thy presiding star propitious shone,
Shouldst Wildman be"

When a tall youth he was removed from hence to a distant village, where he died, as I understand, before he arrived at manhood. I am, etc.

LETTER XXVIII.

SELBORNE, *Jan. 8th*, 1776.

DEAR SIR,—It is the hardest thing in the world to shake off superstitious prejudices, they are sucked in, as it were, with our mother's milk; and growing up with us at a time when they take the fastest hold and make the most lasting impressions, become so interwoven into our very constitutions, that the strongest good sense is required to disengage ourselves from them. No wonder, therefore, that the lower people retain them their whole lives through, since their minds are not invigorated by a liberal education, and therefore not enabled to make any efforts adequate to the occasion.

Such a preamble seems to be necessary before we

enter on the superstitions of this district, lest we should be suspected of exaggeration in a recital of practices too gross for this enlightened age.

But the people of Tring, in Hertfordshire, would do well to remember that no longer ago than the year 1751, and within twenty miles of the capital, they seized on two superannuated wretches, crazed with age, and overwhelmed with infirmities, on a suspicion of witchcraft; and, by trying experiments, drowned them in a horse-pond.

In a farm-yard near the middle of this village stands at this day, a row of pollard-ashes, which by the seams and long cicatrices down their sides, manifestly show that, in former times, they have been cleft asunder. These trees when young and flexible, were severed and held open by wedges, while ruptured children, stripped naked, were pushed through the apertures, under a persuasion that, by such a process, the poor babes would be cured of their infirmity. As soon as the operation was over, the tree, in the suffering part, was plastered with loam, and carefully swathed up. If the parts coalesced and soldered together, as usually fell out, where the feat was performed with any adroitness at all, the party was cured; but, where the cleft continued to gape, the operation it was supposed, would prove ineffectual. Having occasion to enlarge my garden not long since, I cut

down two or three such trees, one of which did not grow together.

We have several persons now living in the village who, in their childhood, were supposed to be healed by this superstitious ceremony, derived down perhaps from our Saxon ancestors, who practised it before their conversion to Christianity.

At the fourth corner of the Plestor, or area, near the church, there stood, about twenty years ago, a very old grotesque hollow pollard-ash, which for ages had been looked on with no small veneration as a shrew-ash. Now a shrew-ash is an ash whose twigs or branches, when gently applied to the limbs of cattle, will immediately relieve the pains which a beast suffers from the running of a shrew-mouse over the part affected; for it is supposed that a shrew-mouse is of so baneful and deleterious a nature, that wherever it creeps over a beast, be it horse, cow, or sheep, the suffering animal is afflicted with cruel anguish, and threatened with the loss of the use of the limb. Against this accident, to which they were continually liable, our provident forefathers always kept a shrew-ash at hand, which when once mediated, would maintain its virtue for ever. A shrew-ash was made thus:—Into the body of the tree a deep hole was bored with an auger, and a poor starved shrew-mouse was thrust in alive, and plugged in, no doubt, with several quaint incantations

long since forgotten. As the ceremonies necessary for such a consecration are no longer understood, all succession is at an end, and no such tree is known to subsist in the manor, or hundred.

As to that on the Plestor

"The late Vicar stubb'd and burnt it,"

when he was way-warden, regardless of the remonstrances of the bystanders, who interceded in vain for its preservation, urging its power and efficacy, and alleging that it had been

"Religione patrum multos servata per annos."

I am, etc.

LETTER XXIX.

SELBORNE, *Feb. 1st*, 1775.

DEAR SIR,—In heavy fogs, on elevated situations especially, trees are perfect alembics; and no one that has not attended to such matters can imagine how much water one tree will distil in a night's time, by condensing the vapour, which trickles down the twigs and boughs, so as to make the ground below quite in a float. In Newton Lane, in October, 1775, on a misty day, a particular oak in leaf dropped so fast that the carter was

stood in puddles and the ruts ran with water, though the ground in general was dusty.

In some of our smaller islands in the West Indies, if I mistake not, there are no springs or rivers; but the people are supplied with that necessary element, water, merely by the dripping of some large teak trees, which, standing in the bosom of a mountain, keep their heads constantly enveloped with fogs and clouds, from which they dispense their kindly never-ceasing moisture; and so render those districts habitable by condensation alone.

Trees in leaf have such a vast proportion more of surface than those that are naked, that, in theory, their condensations should greatly exceed those that are stripped of their leaves; but, as the former imbibe also a great quantity of moisture, it is difficult to say which drip most: but this I know, that deciduous trees that are entwined with much ivy seem to distil the greatest quantity. Ivy-leaves are smooth, and thick, and cold, and therefore condense very fast; and besides, evergreens imbibe very little. These facts may furnish the intelligent with hints concerning what sorts of trees they should plant round small ponds that they would wish to be perennial; and show them how advantageous some trees are in preference to others.

Trees perspire profusely, condense largely, and check evaporation so much, that woods are always moist, as

wonder, therefore, that they contribute much to pools and streams.

That trees are great promoters of lakes and rivers appears from a well-known fact in North America; for, since the woods and forests have been grubbed and cleared, all bodies of water are much diminished; so that some streams that were very considerable a century ago, will not now drive a common mill. Besides, most woodlands, forests, and chases, with us abound with pools and morasses; no doubt for the reason given above.

To a thinking mind few phenomena are more strange than the state of little ponds on the summits of chalk-hills, many of which are never dry in the most trying droughts of summer. On chalk-hills I say, because in many rocky and gravelly soils springs usually break out pretty high on the sides of elevated grounds and mountains: but no person acquainted with chalky districts will allow that they ever saw springs in such a soil but in valleys and bottoms, since the waters of so pervious a stratum as chalk all lie on one dead level, as well-diggers have assured me again and again.

Now we have many such little round ponds in this district; and one in particular on our sheep-down, three hundred feet above my house; which, though never above three feet deep in the middle, and not more than thirty feet in diameter, and containing per-

hops not more than two or three hundred hogsheads of water, yet never is known to fail, though it affords drink for three hundred or four hundred sheep, and for at least twenty head of large cattle beside. This pond, it is true, is overhung with two moderate beeches, that, doubtless, at times afford it much supply: but then we have others as small, that, without the aid of trees, and in spite of evaporation from sun and wind, and perpetual consumption by cattle, yet constantly maintain a moderate share of water, without overflowing in the wettest seasons, as they would do if supplied by springs. By my journal of May, 1775, it appears that "the small and even considerable ponds in the vales are now dried up, while the small ponds on the very tops of hills are but little affected." Can this difference be accounted for from evaporation alone, which certainly is more prevalent in bottoms? or rather have not those elevated pools some unnoticed recruits, which in the night time counterbalance the waste of the day; without which the cattle alone must soon exhaust them? And here it will be necessary to enter more minutely into the cause. Dr. Hales, in his Vegetable Statics, advances, from experiment, that "the moister the earth is the more dew falls on it in a night; and more than a double quantity of dew falls on a surface of water than there does on an equal surface of moist earth." Hence we see that water, by its coolness, is enabled to

assimilate to itself a large quantity of moisture nightly by condensation; and that the air, when loaded with fogs and vapours, and even with copious dews, can alone advance a considerable and never-failing resource. Persons that are much abroad, and travel early and late, such as shepherds, fishermen, etc. can tell what prodigious fogs prevail in the night on elevated downs, even in the hottest parts of summer; and how much the surfaces of things are drenched by those swimming vapours, though, to the senses, all the while, little moisture seems to fall.

I am, etc.

LETTER XXX.

SELBORNE, *April 3d*, 1776.

DEAR SIR,—Monsieur Herissant, a French anatomist, seems persuaded that he has discovered the reason why cuckoos do not hatch their own eggs; the impediment, he supposes, arises from the internal structure of their parts, which incapacitates them for incubation. According to this gentleman, the crop, or craw, of a cuckoo does not lie before the *sternum* at the bottom of the neck, as in the *gallinæ*, *columbæ*, etc., but immediately behind it, on and over the bowels, so as to make a large protuberance in the belly.

Induced by this assertion, we procured a cuckoo; and, cutting open the breast-bone, and exposing the intestines to sight, found the crop lying as mentioned above. This stomach was large and round, and stuffed hard, like a pincushion, with food, which, upon nice examination, we found to consist of various insects; such as small scarabs, spiders, and dragon-flies; the last of which we have seen cuckoos catching on the wing as they were just emerging out of the aurelia state. Among this farrago also were to be seen maggots, and many seeds, which belonged either to gooseberries, currants, cranberries, or some such fruit; so that these birds apparently subsist on insects and fruits; nor was there the least appearance of bones, feathers, or fur, to support the idle notion of their being birds of prey.

The sternum in this bird seemed to us to be remarkably short, between which and the anus lay the crop, or craw, and immediately behind that the bowels against the back-bone.

It must be allowed, as this anatomist observes, that the crop placed just upon the bowels must, especially when full, be in a very uneasy situation during the business of incubation; yet the test will be to examine whether birds that are actually known to sit for certain are not formed in a similar manner. This inquiry I proposed to myself to make with a fern-fowl, or goat-

sucker, as soon as opportunity offered: because, if their formation proves the same, the reason for incapacity in the cuckoo will be allowed to have been taken up somewhat hastily.

Not long after a fern-owl was procured, which, from its habit and shape, we suspected might resemble the cuckoo in its internal construction. Nor were our suspicions ill-grounded; for, upon the dissection, the crop, or craw, also lay behind the sternum, immediately on the viscera, between them and the skin of the belly. It was bulky, and stuffed hard with large *phalænæ*, moths of several sorts, and their eggs, which no doubt had been forced out of those insects by the action of swallowing.

Now as it appears that this bird, which is so well known to practise incubation, is formed in a similar manner with cuckoos, Monsieur Herissant's conjecture, that cuckoos are incapable of incubation from the disposition of their intestines, seems to fall to the ground; and we are still at a loss for the cause of that strange and singular peculiarity in the instance of the *cuculus canorus*.

We found the case to be the same with the ring-tail hawk, in respect to formation; and, as far as I can recollect, with the swift; and probably it is so with many more sorts of birds that are not granivorous.

I am, etc.

LETTER XXXI.

SELBORNE, *April 29th*, 1776.

DEAR SIR,—On August 4th, 1775, we surprised a large viper, which seemed very heavy and bloated, as it lay in the grass basking in the sun. When we came to cut it up, we found that the abdomen was crowded with young, fifteen in number; the shortest of which measured full seven inches, and were about the size of full-grown earth-worms. This little fry issued into the world with the true viper-spirit about them, showing great alertness as soon as disengaged from the belly of the dam: they twisted and wriggled about, and set themselves up, and gaped very wide when touched with a stick, showing manifest tokens of menace and defiance, though as yet they had no manner of fangs that we could find, even with the help of our glasses.

To a thinking mind nothing is more wonderful than that early instinct which impresses young animals with a notion of the situation of their natural weapons, and of using them properly in their own defence, even before those weapons subsist or are formed. Thus a young cock will spar at his adversary before his spurs are grown: and a calf or a lamb will push with their heads before their horns are sprouted. In the same manner did these young adders attempt to bite before

their fangs were in being. The dam however was furnished with very formidable ones, which we lifted up (for they fold down when not used), and cut them off with the point of our scissors.

There was little room to suppose that this brood had ever been in the open air before; and that they were taken in for refuge, at the mouth of the dam, when she perceived that danger was approaching; because then probably we should have found them somewhere in the neck, and not in the abdomen.

LETTER XXXII.

CASTRATION has a strange effect: it emasculates both man, beast, and bird, and brings them to a near resemblance of the other sex. Thus eunuchs have smooth, unmuscular arms, thighs, and legs; and broad hips, and beardless chins, and squeaking voices. Gelt stags and bucks have hornless heads, like hinds and does. Thus wethers have small horns, like ewes; and oxen large bent horns, and hoarse voices when they low, like cows: for bulls have short straight horns; and though they mutter and grumble in a deep, tremendous tone, yet they low in a shrill high key. Capons have small combs and gills, and look pallid about the head.

like pullets; they also walk without any parade, and hover chickens like hens. Barrow-hogs have also small tusks like sows.

Thus far it is plain that the deprivation of masculine vigour puts a stop to the growth of those parts or appendages that are looked upon as its insignia. But the ingenious Mr. Lisle, in his book on husbandry, carries it much farther; for he says that the loss of those insignia alone has sometimes a strange effect on the ability itself: he had a boar so fierce and venereous, that, to prevent mischief, orders were given for his tusks to be broken off. No sooner had the beast suffered this injury than his powers forsook him, and he neglected those females to whom before he was passionately attached, and from whom no fences would restrain him.

LETTER XXXIII.

THE natural term of a hog's life is little known, and the reason is plain—because it is neither profitable nor convenient to keep that turbulent animal to the full extent of its time: however, my neighbour, a man of substance, who had no occasion to study every little advantage to a nicety, kept a half-bred bantam-sow, who was as thick as she was long, and whose belly

swept on the ground till she was advanced to her seventeenth year, at which period she showed some tokens of age by the decay of her teeth and the decline of her fertility.

For about ten years this prolific mother produced two litters in the year of about ten at a time, and once above twenty at a litter; but, as there were near double the number of pigs to that of teats, many died. From long experience in the world this female was grown very sagacious and artful. When she found occasion to converse with a boar, she used to open all the intervening gates, and march, by herself, up to a distant farm where one was kept; and when her purpose was served, would return by the same means. At the age of about fifteen her litters began to be reduced to four or five, and such a litter she exhibited when in her fatting-pen. She proved, when fat, good bacon, juicy, and tender; the rind, or sward, was remarkably thin. At a moderate computation she was allowed to have been the fruitful parent of three hundred pigs: a prodigious instance of fecundity in so large a quadruped! She was killed in spring, 1775.

I am, etc.

LETTER XXXIV.

SELBORNE, *May 9th*, 1776.

" . . . admôrunt ubera tigres."

DEAR SIR,—We have remarked in a former letter * how much incongruous animals, in a lonely state, may be attached to each other from a spirit of sociality; in this it may not be amiss to recount a different motive which has been known to create as strange a fondness.

My friend had a little helpless leveret brought to him, which the servants fed with milk in a spoon, and about the same time his cat kittened and the young were dispatched and buried. The hare was soon lost, and supposed to be gone the way of most foundlings, to be killed by some dog or cat. However, in about a fortnight, as the master was sitting in his garden in the dusk of the evening, he observed his cat, with tail erect, trotting towards him, and calling with little short inward notes of complacency, such as they use towards their kittens, and something gamboling after, which proved to be the leveret that the cat had supported with her milk, and continued to support with great affection.

Thus was a graminivorous animal nurtured by a carnivorous and predaceous one!

* Letter XXIV.

Why so cruel and sanguinary a beast as a cat, of the ferocious genus of *Felis*, the *murium leo*, as Linnæus calls it, should be affected with any tenderness towards an animal which is its natural prey, is not so easy to determine.

. . . . .

This strange affection probably was occasioned by that desideriam, those tender maternal feelings, which the loss of her kittens had awakened in her breast; and by the complacency and ease she derived to herself from the procuring her teats to be drawn, which were too much distended with milk, till, from habit, she became as much delighted with this foundling as if it had been her real offspring.

This incident is no bad solution of that strange circumstance which grave historians as well as the poets assert of exposed children being sometimes nurtured by female wild beasts that probably had lost their young. For it is not one whit more marvellous that Romulus and Remus, in their infant state, should be nursed by a she-wolf, than that a poor little sucking leveret should be fostered and cherished by a bloody grimalkin.

. . . . . viridi fœtam Mavortis in antro
Procubuisse lupam: geminos huic ubera circum
Ludere pendentes pueros, et lambere matrem
Impavidos: illam tereti cervice reflexam
Mulcere alternos, et corpora fingere linguâ."

LETTER XXXV.

SELBORNE, *May 20th*, 1777.

DEAR SIR,—Lands that are subject to frequent inundations are always poor; and probably the reason may be, because the worms are drowned. The most insignificant insects and reptiles are of much more consequence, and have much more influence in the economy of Nature than the incurious are aware of, and are mighty in their effect, from their minuteness, which renders them less an object of attention, and from their numbers and fecundity. Earth-worms, though in appearance a small and despicable link in the chain of Nature, yet, if lost, would make a lamentable chasm. For, to say nothing of half the birds, and some quadrupeds, which are almost entirely supported by them, worms seem to be the great promoters of vegetation, which would proceed but lamely without them, by boring, perforating, and loosening the soil, and rendering it pervious to rains and the fibres of plants, by drawing straws and stalks of leaves and twigs into it, and, most of all, by throwing up such infinite numbers of lumps of earth called worm-casts, which, being their excrement, is a fine manure for grain and grass. Worms probably provide new soil for hills and slopes where the rain washes the earth

away; and they affect slopes, probably to avoid being flooded. Gardeners and farmers express their detestation of worms; the former because they render their walks unsightly, and make them much work; and the latter because, as they think, worms eat their green corn. But these men would find that the earth without worms would soon become cold, hard-bound, and void of fermentation, and consequently sterile; and besides, in favour of worms, it should be hinted that green corn, plants, and flowers, are not so much injured by them as by many species of *coleoptera* (scarabs), and *tipulæ* (long-legs) in their larva, or grub-state, and by unnoticed myriads of small shell-less snails, called slugs, which silently and imperceptibly make amazing havoc in the field and garden.*

These hints we think proper to throw out in order to set the inquisitive and discerning to work.

A good monography of worms would afford much entertainment and information at the same time, and would open a large and new field in natural history. Worms work most in the spring, but by no means lie torpid in the dead months: are out every mild night in the winter, as any person may be convinced that

* Farmer Young, of Norton Farm, says that this spring (1777) about four acres of his wheat in one field were entirely destroyed by slugs, which swarmed on the blades of corn, and devoured it as fast as it sprung.

will take the pains to examine his grass-plots with a candle, are hermaphrodites, and very prolific.

I am, etc.

LETTER XXXVI.

SELBORNE, *Nov. 22nd*, 1777.

DEAR SIR,—You cannot but remember that the 26th and 27th of last March were very hot days—so sultry that everybody complained and were restless under those sensations to which they had not been reconciled by gradual approaches.

This sudden summer-like heat was attended by many summer coincidences; for on those two days the thermometer rose to 66° in the shade; many species of insects revived and came forth; some bees swarmed in this neighbourhood; the old tortoise, near Lewes, in Sussex, awakened and came forth out of its dormitory; and, what is most to my present purpose, many house-swallows appeared and were very alert in many places, and particularly at Chobham, in Surrey.

But as that short, warm period was succeeded as well as preceded by harsh, severe weather, with frequent frosts and ice, and cutting winds, the insects withdrew, the tortoise retired again into the ground,

and the swallows were seen no more until the 10th April, when, the rigour of the spring abating, a softer season began to prevail.

Again, it appears by my journals for many years past that house-martins retire, to a bird, about the beginning of October, so that a person not very observant of such matters would conclude that they had taken their last farewell; but then it may be seen in my diaries also that considerable flocks have discovered themselves again in the first week of November, and often on the fourth day of that month, only for one day, and that not as if they were in actual migration, but playing about at their leisure and feeding calmly, as if no enterprise of moment at all agitated their spirits. And this was the case in the beginning of this very month; for on the 4th November more than twenty house-martins, which, in appearance, had all departed about the 7th October, were seen again for that one morning only sporting between my fields and the Hanger, and feasting on insects which swarmed in that sheltered district. The preceding day was wet and blustering, but the 4th was dark, and mild, and soft, the wind at south-west, and the thermometer at 58½°, a pitch not common at that season of the year. Moreover, it may not be amiss to add in this place, that whenever the thermometer is above 50°, the bat comes flitting out in every autumnal and winter month.

From all these circumstances laid together, it is obvious that torpid insects, reptiles, and quadrupeds, are awakened from their profoundest slumbers by a little untimely warmth, and therefore that nothing so much promotes its death-like stupor as a defect of heat. And farther, it is reasonable to suppose that two whole species, or at least many individuals of those two species of British hirundines, do never leave this island at all, but partake of the same benumbed state; for we cannot suppose, that after a month's absence, house-martins can return from southern regions to appear for one morning in November, or that house-swallows should leave the districts of Asia to enjoy in March the transient summer of a couple of days.

I am, etc.

LETTER XXXVII.

SELBORNE, *Jan. 8th*, 1778.

DEAR SIR,—There was in this village several years ago a miserable pauper, who from his birth was afflicted with a leprosy, as far as we are aware of a singular kind, since it affected only the palms of his hands and the soles of his feet. This scaly eruption usually broke out twice in the year, at the spring and

fall; and, by peeling away, left the skin so thin and tender that neither his hands nor feet were able to perform their functions; so that the poor object was half his time on crutches, incapable of employ, and languishing in a tiresome state of indolence and inactivity. His habit was lean, lank, and cadaverous. In this sad plight he dragged on a miserable existence, a burden to himself and his parish, which was obliged to support him till he was relieved by death at more than thirty years of age.

The good women, who love to account for every defect in children by the doctrine of longing, said that his mother felt a violent propensity for oysters, which she was unable to gratify; and that the black rough scurf on his hands and feet were the shells of that fish. We knew his parents, neither of which were lepers; his father in particular lived to be far advanced in years.

In all ages the leprosy has made dreadful havoc among mankind. The Israelites seem to have been greatly afflicted with it from the most remote times, as appears from the peculiar and repeated injunctions given them in the Levitical law. Nor was the rancour of this foul disorder much abated in the last period of their commonwealth, as may be seen in many passages of the New Testament.

Some centuries ago this horrible distemper prevailed

all Europe over: and our forefathers were by no means exempt, as appears by the large provision made for objects labouring under this calamity. There was a hospital for female lepers in the diocese of Lincoln; a noble one near Durham; three in London and Southwark; and perhaps many more in or near our great towns and cities. Moreover, some crowned heads, and other wealthy and charitable personages, bequeathed large legacies to such poor people as languished under this hopeless infirmity.

It must, therefore, in these days be to a humane and thinking person a matter of equal wonder and satisfaction, when he contemplates how nearly this pest is eradicated, and observes that a leper now is a rare sight. He will, moreover, when engaged in such a train of thought, naturally inquire for the reason. This happy change, perhaps, may have originated and been continued from the much smaller quantity of salted meat and fish now eaten in these kingdoms; from the use of linen next the skin; from the plenty of better bread; and from the profusion of fruits, roots, legumes, and greens, so common in every family. Three or four centuries ago, before there were any enclosures, sown grasses, field-turnips, or field-carrots, or hay, all the cattle which had grown fat in summer, and were not killed for winter use, were turned out soon after Michaelmas to shift as they could through

the dead months; so that no fresh meat could be had in winter or spring. Hence the marvellous account of the vast stores of salted flesh found in the larder of the eldest Spencer in the days of Edward II., even so late in the spring as the 3rd May. It was from magazines like these that turbulent barons supported in idleness their riotous swarms of retainers ready for any disorder or mischief. But agriculture is now arrived at such a pitch of perfection that our best and fattest meats are killed in the winter, and no man need eat salted flesh, unless he prefers it, that has money to buy fresh.

One cause of this distemper might be, no doubt, the quantity of wretched fresh and salt fish consumed by the commonalty at all seasons as well as in Lent, which our poor now would hardly be persuaded to touch.

The use of linen changes, shirts or shifts, in the room of sordid and filthy woollen, long worn next the skin, is a matter of neatness comparatively modern, but must prove a great means of preventing cutaneous ails. At this very time woollen, instead of linen, prevails among the poorer Welsh, who are subject to foul eruptions.

The plenty of good wheaten bread that now is found among all ranks of people in the south, instead of that miserable sort which used in old days to be made of barley or beans, may contribute not a little to the

sweetening their blood and correcting their juices, for the inhabitants of mountainous districts to this day are still liable to the itch and other cutaneous disorders, from a wretchedness and poverty of diet.

As to the produce of a garden, every middle-aged person of observation may perceive, within his own memory, both in town and country, how vastly the consumption of vegetables is increased. Green-stalls in cities now support multitudes in a comfortable state, while gardeners get fortunes. Every decent labourer also has his garden, which is half his support, as well as his delight; and common farmers provide plenty of beans, peas, and greens, for their hinds to eat with their bacon; and those few that do not are despised for their sordid parsimony, and looked upon as regardless of the welfare of their dependents. Potatoes have prevailed in this little district by means of premiums within these twenty years only, and are much esteemed here now by the poor, who would scarce have ventured to taste them in the last reign.

Our Saxon ancestors certainly had some sort of cabbage, because they call the month of February "sprout-cale;" but long after their days the cultivation of gardens was little attended to. The religious, being men of leisure, and keeping up a constant correspondence with Italy, were the first people among us that had gardens and fruit-trees in any perfection

within the wall of their abbeys and priories. The barons neglected every pursuit that did not lead to war or tend to the pleasure of the chase.

It was not till gentlemen took up the study of horticulture themselves that the knowledge of gardening made such hasty advances. Lord Cobham, Lord Ila, and Mr. Waller, of Beaconsfield, were some of the first people of rank that promoted the elegant science of ornamenting without despising the superintendence of the kitchen quarters and fruit walls.

A remark made by the excellent Mr. Ray, in his "Tour of Europe," at once surprises us, and corroborates what has been advanced above; for we find him observing so late as his days, that, "The Italians use several herbs for sallets, which are not yet, or have not been but lately, used in England, viz., *selleri* (celery), which is nothing else but the sweet smallage; the young shoots whereof, with a little of the head of the root cut off, they eat raw with oil and pepper;" and further adds: "curled endive blanched is much used beyond seas; and for a raw sallet, seemed to excell lettuce itself." Now this journey was undertaken no longer ago than in the year 1663.

I am, etc.

LETTER XXXVIII.

SELBORNE, *Feb.* 12*th*, 1778.

"Fortè puer, comitum seductus ab agmine fido,
Dixerat, ecquis adest? et, adest, responderat echo.
Hic stupet; utque aciem partes divisit in omnes;
Voce, veni, clamat magnâ. Vocat illa vocantem."

DEAR SIR,—In a district so diversified as this, so full of hollow vales and hanging woods, it is no wonder that echoes should abound. Many we have discovered that return the cry of a pack of dogs, the notes of a hunting-horn, a tunable ring of bells, or the melody of birds very agreeably; but we were still at a loss for a polysyllabical articulate echo, till a young gentleman, who had parted from his company in a summer evening walk, and was calling after them, stumbled upon a very curious one in a spot where it might least be expected. At first he was much surprised, and could not be persuaded but that he was mocked by some boy; but repeating his trials in several languages, and finding his respondent to be a very adroit polyglot, he then discerned the deception.

This echo in an evening, before rural noises cease, would repeat ten syllables most articulately and distinctly, especially if quick dactyls were chosen. The last syllables of

"Tityre, tu patulæ recubans . . . ."

were as audibly and intelligibly returned as the first; and there is no doubt, could trial have been made, but that at midnight, when the air is very elastic, and a dead stillness prevails, one or two syllables more might have been obtained; but the distance rendered so late an experiment very inconvenient.

Quick dactyls, we observed, succeeded best; for when we came to try its powers in slow, heavy, embarrassed spondees of the same number of syllables,

"Monstrum horreadum, informe, ingens . . ."

we could perceive a return but of four or five.

All echoes have some one place to which they are returned stronger and more distinct than to any other; and that is always the place that lies at right angles with the object of repercussion, and is not too near, nor too far off. Buildings, or naked rocks, re-echo much more articulately than hanging woods or vales; because in the latter the voice is as it were entangled, and embarrassed in the covert, and weakened in the rebound.

The true object of this echo, as we found by various experiments, is the stone-built, tiled hop-kiln in Gally Lane, which measures in front forty feet, and from the ground to the eaves twelve feet. The true *centrum phonicum*, or just distance, is one particular spot in the king's field, in the path to Nore Hill, on the very brink of the steep balk above the hollow cart-way. In this

case there is no choice of distance; but the path, by mere contingency, happens to be the lucky, the identical spot, because the ground rises or falls so immediately, if the speaker either retires or advances, that his mouth would at once be above or below the object.

We measured this polysyllabical echo with great exactness, and found the distance to fall very short of Dr. Plot's rule for distinct articulation; for the doctor, in his history of Oxfordshire, allows a hundred and twenty feet for the return of each syllable distinctly; hence this echo, which gives ten distinct syllables, ought to measure four hundred yards, or one hundred and twenty feet to each syllable; whereas our distance is only two hundred and fifty-eight yards, or near seventy-five feet, to each syllable. Thus our measure falls short of the doctor's, as five to eight; but then it must be acknowledged that this candid philosopher was convinced afterwards, that some latitude must be admitted of in the distance of echoes according to time and place.

When experiments of this sort are making, it should always be remembered that weather and the time of day have a vast influence on an echo; for a dull, heavy, moist air deadens and clogs the sound; and hot sunshine renders the air thin and weak, and deprives it of all its springiness, and a ruffling wind quite defeats the

whole. In a still, clear, dewy evening the air is most elastic; and perhaps the later the hour the more so.

Echo has always been so amusing to the imagination, that the poets have personified her; and in their hands she has been the occasion of many a beautiful fiction. Nor need the gravest man be ashamed to appear taken with such a phenomenon, since it may become the subject of philosophical or mathematical inquiries.

One should have imagined that echoes, if not entertaining, must at least have been harmless and inoffensive; yet, Virgil advances a strange notion, that they are injurious to bees. After enumerating some probable and reasonable annoyances, such as prudent owners would wish far removed from their bee-gardens, he adds—

"aut ubi concava pulsu
Saxa sonant, vocisque offensa resultat imago."

This wild and fanciful assertion will hardly be admitted by the philosophers of these days, especially as they all now seem agreed that insects are not furnished with any organs of hearing at all. But if it should be urged, that though they cannot hear yet perhaps they may feel the repercussions of sounds, I grant it is possible they may. Yet that these impressions are distasteful or hurtful, I deny, because bees, in good summers, thrive well in my outlet,

where the echoes are very strong; for this village is another Anathoth, a place of responses and echoes. Besides, it does not appear from experiment that bees are in any way capable of being affected by sounds; for I have often tried my own with a large speaking-trumpet held close to their hives, and with such an exertion of voice as would have hailed a ship at the distance of a mile, and still these insects pursued their various employments undisturbed, and without showing the least sensibility or resentment.

Some time since its discovery this echo is become totally silent, though the object, or hop-kiln, remains; nor is there any mystery in this defect; for the field between is planted as a hop-garden, and the voice of the speaker is totally absorbed and lost among the poles and entangled foliage of the hops. And when the poles are removed in autumn the disappointment is the same; because a tall quick-set hedge, nurtured up for the purpose of shelter to the hop ground, entirely interrupts the impulse and repercussion of the voice; so that till those obstructions are removed no more of its garrulity can be expected.

Should any gentleman of fortune think an echo in his park or outlet a pleasing incident, he might build one at little or no expense. For whenever he had occasion for a new barn, stable, dog-kennel, or the like structure, it would be only needful to erect this

building on the gentle declivity of a hill, with a like rising opposite to it, at a few hundred yards distance; and perhaps success might be the easier ensured could some canal, lake, or stream intervene. From a seat at the *centrum phonicum* he and his friends might amuse themselves sometimes of an evening with the prattle of this loquacious nymph; of whose complacency and decent reserve more may be said than can with truth of every individual of her sex; since she is . . . . . .

" —— quæ nec reticere loquenti,
Nec prior ipsa loqui didicit resonabilis echo."

I am, etc.

P.S.—The classic reader will, I trust, pardon the following lovely quotation, so finely describing echoes, and so poetically accounting for their causes from popular superstition:—

" Quæ benè quom videas, rationem reddere possis
Tute tibi atque aliis, quo pacto per loca sola
Saxa paries formas verborum ex ordine reddant,
Palanteis comites quom monteis inter opacos
Quærimus, et magna dispersos voce ciemus.
Sex etiam, aut septem loca vidi reddere voces
Unam quom jaceres: ita colles collibus ipsis
Verba repulsantes iterabant dicta referre.
Hæc loca capripedes Satyros, Nymphasque tenere
Finitimi fingunt, et Faunos esse loquuntur;
Quorum noctivago strepitu, ludoque jocanti

Adfirmant volgo taciturna silentia rumpi,
Chordarumque sonos fieri, dulcesque querelas,
Tibia quas fundit digitis pulsata canentum:
Et genus agricolûm latè sentiscere, quom Pan
Pinea semiferi capitis velamina quassans,
Unco sæpe labro calamos percurrit hiantes,
Fistula silvestrem ne cessèt fundere musam."

LUCRETIUS, Lib. iv. l. 576.

LETTER XXXIX.

SELBORNE, *May* 13*th*, 1778.

DEAR SIR,—Among the many singularities attending those amusing birds the swifts, I am now confirmed in the opinion that we have every year the same number of pairs invariably; at least the result of my inquiry has been exactly the same for a long time past. The swallows and martins are so numerous, and so widely distributed over the village, that it is hardly possible to recount them; while the swifts, though they do not build in the church, yet so frequently haunt it, and play and rendezvous round it, that they are easily enumerated. The number that I constantly find are eight pairs; about half of which reside in the church, and the rest build in some of the lowest and meanest thatched cottages. Now as these eight pairs, allowance

being made for accidents, breed yearly eight pairs more, what becomes annually of this increase; and what determines every spring which pairs shall visit us, and reoccupy their ancient haunts?

Ever since I have attended to the subject of ornithology, I have always supposed that that sudden reverse of affection, that strange *αντιστοργή*, which immediately succeeds in the feathered kind to the most passionate fondness, is the occasion of an equal dispersion of birds over the face of the earth. Without this provision one favourite district would be crowded with inhabitants, while others would be destitute and forsaken. But the parent birds seem to maintain a jealous superiority, and to oblige the young to seek for new abodes; and the rivalry of the males in many kinds, prevents their crowding the one on the other. Whether the swallows and house-martins return in the same exact number annually is not easy to say, for reasons given above; but it is apparent, as I have remarked before in my Monographies, that the numbers returning bear no manner of proportion to the numbers retiring.

LETTER XL.

SELBORNE, *June 2nd*, 1778.

DEAR SIR,—The standing objection to botany has always been, that it is a pursuit that amuses the fancy and exercises the memory, without improving the mind or advancing any real knowledge; and, where the science is carried no farther than a mere systematic classification, the charge is but too true. But the botanist that is desirous of wiping off this aspersion should be by no means content with a list of names; he should study plants philosophically, should investigate the laws of vegetation, should examine the powers and virtues of efficacious herbs, should promote their cultivation; and graft the gardener, the planter, and the husbandman, on the phytologist. Not that system is by any means to be thrown aside; without system the field of Nature would be a pathless wilderness; but system should be subservient to, not the main object of, pursuit.

Vegetation is highly worthy of our attention; and in itself is of the utmost consequence to mankind, and productive of many of the greatest comforts and elegances of life. To plants we owe timber, bread, beer, honey, wine, oil, linen, cotton, etc., what not only strengthens our hearts, and exhilarates our spirits, but

what secures us from inclemencies of weather and adorns our persons. Man, in his true state of nature, seems to be subsisted by spontaneous vegetation; in middle climes, where grasses prevail, he mixes some animal food with the produce of the field and garden; and it is towards the polar extremes only that, like his kindred bears and wolves, he gorges himself with flesh alone, and is driven to what hunger has never been known to compel the very beasts, to prey on his own species.

The productions of vegetation have had a vast influence on the commerce of nations, and have been the great promoters of navigation, as may be seen in the articles of sugar, tea, tobacco, opium, ginsing, betel, paper, etc. As every climate has its peculiar produce, our natural wants bring on a mutual intercourse; so that by means of trade each distinct part is supplied with the growth of every latitude. But, without the knowledge of plants and their culture, we must have been content with our hips and haws, without enjoying the delicate fruits of India and the salutiferous drugs of Peru.

Instead of examining the minute distinctions of every various species of each obscure genus, the botanist should endeavour to make himself acquainted with those that are useful. You shall see a man readily ascertain every herb of the field, yet hardly

know wheat from barley, or at least one sort of wheat or barley from another.

But of all sorts of vegetation the grasses seem to be most neglected; neither the farmer nor the grazier seem to distinguish the annual from the perennial, the hardy from the tender, nor the succulent and nutritive from the dry and juiceless.

The study of grasses would be of great consequence to a northerly and grazing kingdom. The botanist that could improve the sward of the district where he lived would be a useful member of society: to raise a thick turf on a naked soil would be worth volumes of systematic knowledge; and he would be the best commonwealth's man that could occasion the growth of "two blades of grass where one alone was seen before."

I am, etc.

LETTER XLI.

SELBORNE, *July 3rd*, 1778.

DEAR SIR,—In a district so diversified with such a variety of hill and dale, aspects, and soils, it is no wonder that great choice of plants should be found. Chalks, clays, sands, sheep-walks and downs, bogs, heaths, woodlands, and champaign fields, cannot but

furnish an ample Flora. The deep rocky lanes abound with *filices*, and the pastures and moist woods with *fungi*. If in any branch of botany we may seem to be wanting, it must be in the large aquatic plants, which are not to be expected on a spot far removed from rivers, and lying up amidst the hill country at the spring heads. To enumerate all the plants that have been discovered within our limits would be a needless work; but a short list of the more rare, and the spots where they are to be found, may be neither unacceptable nor unentertaining:—

Helleborus fœtidus, stinking hellebore, bear's foot, or setterworth,—all over the High Wood and Coney-croft Hanger: this continues a great branching-plant the winter through, blossoming about January, and is very ornamental in shady walks and shrubberies. The good women give the leaves powdered to children troubled with worms; but it is a violent remedy, and ought to be administered with caution.

Helleborus viridis, green hellebore,—in the deep stony lane on the left hand just before the turning to Norton Farm, and at the top of Middle Dorton under the hedge: this plant dies down to the ground early in autumn, and springs again about February, flowering almost as soon as it appears above the ground.

Vaccinium oxycoccos, creeping bilberries, or cranberries,—in the bogs of Bin's Pond.

Vaccinium myrtillus, whortle, or bleaberries—on the dry hillocks of Wolmer Forest.

Drosera rotundifolia, round-leaved sundew—in the bogs of Bin's Pond.

Drosera longifolia, long-leaved sundew—in the bogs of Bin's Pond.

Comarum palustre, purple comarum, or marsh cinquefoil—in the bogs of Bin's Pond.

Hypericum androsæmum, Tutsan, St. John's Wort—in the stony, hollow lanes.

Vinca minor, less periwinkle—in Selborne Hanger and Shrub Wood.

Monotropa hypopithys, yellow monotropa, or birds' nest—in Selborne Hanger under the shady beeches, to whose roots it seems to be parasitical, at the north-west end of the Hanger.

Chlora perfoliata, Blackstonia perfoliata, Hudsoni, perfoliated yellow-wort—on the banks in the King's Field.

Paris quadrifolia, herb of Paris, true-love, or one-berry—in the Church Litten Coppice.

Chrysosplenium oppositifolium, opposite golden saxifrage—in the dark and rocky hollow lanes.

Gentiana amarella, autumnal gentian or fellwort—on the Zigzag and Hanger.

Lathræa squamaria, tooth-wort—in the Church Litten Coppice under some hazels near the foot-bridge,

in Trimming's garden hedge, and on the dry wall opposite Grange Yard.

Dipsacus pilosus, small teasel—in the Short and Long Lith.

Lathyrus sylvestris, narrow-leaved, or wild lathyrus—in the bushes at the foot of the Short Lith, near the path.

Ophrys spiralis, ladies' traces—in the Long Lith, and towards the south corner of the common.

Ophrys nidus avis, birds' nest ophrys—in the Long Lith under the shady beeches among the dead leaves; in Great Dorton among the bushes, and on the Hanger plentifully.

Serapias latifolia, helleborine—in the High Wood under the shady beeches.

Daphne laureola, spurge laurel—in Selborne Hanger and the High Wood.

Daphne mezereum, the mezereon—in Selborne Hanger among the shrubs, at the south-east end above the cottages.

Lycoperdon tuber, truffles—in the Hanger and High Wood.

Sambucus ebulus, dwarf elder, wallwort, or dane-wort—among the rubbish and ruined foundations of the Priory.

Of all the propensities of plants, none seem more strange than their different periods of blossoming:

Some produce their flowers in the winter, or very first dawnings of spring, many when the spring is established, some at midsummer, and some not till autumn. When we see the *helleborus fœtidus* and *helleborus niger* blowing at Christmas, the *helleborus hyemalis* in January, and the *helleborus viridis* as soon as ever it emerges out of the ground, we do not wonder, because they are kindred plants that we expect should keep pace the one with the other; but other congenerous vegetables differ so widely in their time of flowering, that we cannot but admire. I shall only instance at present in the *crocus sativus*, the vernal and the autumnal crocus, which have such an affinity, that the best botanists only make them varieties of the same genus, of which there is only one species, not being able to discern any difference in the corolla, or in the internal structure. Yet the vernal crocus expands its flowers by the beginning of March at farthest, and often in very rigorous weather, and cannot be retarded but by some violence offered; while the autumnal (the saffron) defies the influence of the spring and summer, and will not blow till most plants begin to fade and run to seed. This circumstance is one of the wonders of the creation, little noticed because a common occurrence, yet ought not to be overlooked on account of its being familiar, since it would be as difficult to

be explained as the most stupendous phenomenon in nature.

"Say, what impels, amidst surrounding snow
Congeal'd, the crocus, flamy bud to glow?
Say, what retards, amidst the summer's blaze,
Th' autumnal bulb, till pale, declining days?
The GOD OF SEASONS; whose pervading power
Controls the sun, or sheds the fleecy shower:
He bids each flower His quickening word obey,
Or to each lingering bloom enjoins delay."

LETTER XLII.

"Omnibus animalibus reliquis certus et unusmodi, et in suo cuique genere incessus est: aves solæ vario meatu feruntur, et in terrâ, et in aere."

SELBORNE, *Aug. 7th*, 1778.

DEAR SIR,—A good ornithologist should be able to distinguish birds by their air as well as by their colours and shape, on the ground as well as on the wing, and in the bush as well as in the hand. For, though it must not be said that every species of birds has a manner peculiar to itself, yet there is somewhat in most *genera* at least, that at first sight discriminates them, and enables a judicious observer to pronounce upon them with some certainty. Put a bird in motion

"——Et verâ incessu patuit——"

Thus kites and buzzards sail round in circles with wings expanded and motionless; and it is from their gliding manner that the former are still called in the north of England gleads, from the Saxon verb glidan, to glide. The kestrel, or wind-hover, has a peculiar mode of hanging in the air in one place, his wings all the while being briskly agitated. Hen-harriers fly low over heaths or fields of corn, and beat the ground regularly like a pointer or setting-dog. Owls move in a buoyant manner, as if lighter than the air; they seem to want ballast. There is a peculiarity belonging to ravens that must draw the attention even of the most incurious; they spend all their leisure time in striking and cuffing each other on the wing in a kind of playful skirmish, and, when they move from one place to another, frequently turn on their backs with a loud croak, and seem to be falling to the ground. When this odd gesture betides them, they are scratching themselves with one foot, and thus lose the centre of gravity. Rooks sometimes dive and tumble in a frolicsome manner; crows and daws swagger in their walk; wood-peckers fly *volatu undoso*, opening and closing their wings at every stroke, and so are always rising or falling in curves. All of this genus use their tails, which incline downward, as a support while they run up trees. Parrots, like all other hooked-clawed birds, walk awkwardly, and make use of their bill as a

third foot, climbing and descending with ridiculous caution. All the *gallinæ* parade and walk gracefully, and run nimbly, but fly with difficulty, with an impetuous whirring, and in a straight line. Magpies and jays flutter with powerless wings, and make no despatch; herons seem encumbered with too much sail for their light bodies, but these vast hollow wings are necessary in carrying burdens, such as large fishes and the like; pigeons, and particularly the sort called smiters, have a way of clashing their wings the one against the other over their backs with a loud snap; another variety, called tumblers, turn themselves over in the air. Some birds have movements peculiar to the season of love. Thus ringdoves, though strong and rapid at other times, yet in the spring hang about on the wing in a toying and playful manner; thus the cock-snipe while breeding, forgetting his former flight, fans the air like the wind-hover; and the green-finch in particular, exhibits such languishing and faltering gestures as to appear like a wounded and dying bird; the king-fisher darts along like an arrow; fern-owls, or goat-suckers, glance in the dusk over the tops of trees like a meteor; starlings, as it were, swim along, while missel-thrushes use a wild and desultory flight; swallows, sweep over the surface of the ground and water, and distinguish themselves by rapid turns and quick evolutions; swifts dash round in circles; and

the bank-martin moves with frequent vacillations like a butterfly. Most of the small birds fly by jerks, rising and falling as they advance. Most small birds hop; but wagtails and larks walk moving their legs alternately. Skylarks rise and fall perpendicularly as they sing; woodlarks hang poised in the air; and titlarks rise and fall in large curves, singing in their descent. The white-throat uses odd jerks and gesticulations over the tops of hedges and bushes. All the duck-kind waddle; divers and auks walk as if fettered, and stand erect on their tails: these are the *compedes* of Linnæus. Geese and cranes, and most wild fowls, move in figured flights, often changing their position. The secondary *remiges* of Tringæ, wild-ducks, and some others, are very long, and give their wings, when in motion, a hooked appearance. Dabchicks, moorhens, and coots, fly erect, with their legs hanging down, and hardly make any despatch. The reason is plain, their wings are placed too forward out of the true centre of gravity, as the legs of auks and divers are situated too backward.

LETTER XLIII.

SELBORNE, *Sept. 9th*, 1778.

DEAR SIR,—From the motion of birds, the transition is natural enough to their notes and language, of which I shall say something. Not that I would pretend to understand their language like the vizier; who, by recital of a conversation which passed between two owls, reclaimed a sultan, before delighting in conquest and devastation; but I would be thought only to mean that many of the winged tribes have various sounds and voices adapted to express their various passions, wants, and feelings; such as anger, fear, love, hatred, hunger, and the like. All species are not equally eloquent; some are copious and fluent as it were in their utterance, while others are confined to a few important sounds: no bird, like the fish kind, is quite mute, though some are rather silent. The language of birds is very ancient, and, like other ancient modes of speech, very elliptical; little is said, but much is meant and understood.

The notes of the eagle-kind are shrill and piercing; and about the season of nidification much diversified, as I have been often assured by a curious observer of Nature, who long resided at Gibraltar, where eagles abound. The notes of our hawks much resemble those of the king of birds. Owls have very expressive notes;

they hoot in a fine vocal sound, much resembling the *vox humana*, and reducible by a pitch-pipe to a musical key. This note seems to express complacency and rivalry among the males; they use also a quick call and a horrible scream: and can snore and hiss when they mean to menace. Ravens, besides their loud croak, can exert a deep and solemn note that makes the woods to echo; the amorous sound of a crow is strange and ridiculous; rooks, in the breeding season, attempt sometimes in the gaiety of their hearts to sing, but with no great success; the parrot-kind have many modulations of voice, as appears by their aptitude to learn human sounds; doves coo in an amorous and mournful manner, and are emblems of despairing lovers; the woodpecker sets up a sort of loud and hearty laugh; the fern-owl, or goat-sucker, from the dusk till daybreak, serenades his mate with the clattering of castanets. All the tuneful *passeres* express their complacency by sweet modulations and a variety of melody. The swallow, as has been observed in a former letter, by a shrill alarm bespeaks the attention of the other hirundines, and bids them be aware the hawk is at hand. Aquatic and gregarious birds, especially the nocturnal, that shift their quarters in the dark, are very noisy and loquacious; as cranes, wild-geese, wild-ducks, and the like; their perpetual clamour prevents them from dispersing and losing their companions.

In so extensive a subject, sketches and outlines are as much as can be expected; for it would be endless to instance in all the infinite variety of the feathered nation. We shall therefore confine the remainder of this letter to the few domestic fowls of our yards, which are most known, and therefore best understood. And first the peacock, with his gorgeous train, demands our attention; but, like most of the gaudy birds, his notes are grating and shocking to the ear: the yelling of cats, and the braying of an ass, are not more disgustful. The voice of the goose is trumpet-like and clanking; and once saved the Capitol at Rome, as grave historians assert; the hiss, also, of the gander, is formidable and full of menace, and "protective of his young." Among ducks the sexual distinction of voice is remarkable; for, while the quack of the female is loud and sonorous, the voice of the drake is inward and harsh, and feeble, and scarce discernible. The cock turkey struts and gobbles to his mistress in a most uncouth manner; he hath also a pert and petulant note when he attacks his adversary. When a hen turkey leads forth her young brood she keeps a watchful eye; and if a bird of prey appear, though ever so high in the air, the careful mother announces the enemy with a little inward moan, and watches him with a steady and attentive look; but if he approach, her note becomes earnest and alarming, and her cutteries are redoubled.

No inhabitants of a yard seem possessed of such a variety of expression and so copious a language as common poultry. Take a chicken of four or five days old, and hold it up to a window where there are flies, and it will immediately seize its prey, with little twitterings of complacency; but if you tender it a wasp or a bee, at once its note becomes harsh, and expressive of disapprobation and a sense of danger. When a pullet is ready to lay she intimates the event by a joyous and easy soft note. Of all the occurrences of their life, that of laying seems to be the most important; for no sooner has a hen disburdened herself, than she rushes forth with a clamorous kind of joy, which the cock and the rest of his mistresses immediately adopt. The tumult is not confined to the family concerned, but catches from yard to yard, and spreads to every homestead within hearing, till at last the whole village is in an uproar. As soon as a hen becomes a mother her new relation demands a new language; she then runs clocking and screaming about, and seems agitated as if possessed. The father of the flock has also a considerable vocabulary; if he finds food, he calls a favourite concubine to partake; and if a bird of prey passes over, with a warning voice he bids his family beware. The gallant chanticleer has at command his amorous phrases and his terms of defiance. But the sound by which he is best known is his

crowing: by this he has been distinguished in all ages as the countryman's clock or larum, as the watchman that proclaims the divisions of the night. Thus the poet elegantly styles him:

"——the crested cock, whose clarion sounds
The silent hours."

A neighbouring gentleman one summer had lost most of his chickens by a sparrow-hawk, that came gliding down between a faggot pile and the end of his house to the place where the coops stood. The owner, inwardly vexed to see his flock thus diminished, hung a setting-net adroitly between the pile and the house, into which the caitiff dashed and was entangled. Resentment suggested the law of retaliation; he therefore clipped the hawk's wings, cut off his talons, and, fixing a cork on his bill, threw him down among the brood-hens. Imagination cannot paint the scene that ensued; the expressions that fear, rage, and revenge inspired, were new, or at least such as had been unnoticed before: the exasperated matrons upbraided, they execrated, they insulted, they triumphed. In a word, they never desisted from buffeting their adversary till they had torn him in a hundred pieces.

LETTER XLIV.

"——Monstrent

* * * * *

Quid tantum Oceano properent se tingere soles
Hyberni; vel quæ tardis mora noctibus obstet."

SELBORNE.

GENTLEMEN who have outlets might contrive to make ornament subservient to utility: a pleasing eye-trap might also contribute to promote science: an obelisk in a garden or park might be both an embellishment and an heliotrope.

Any person that is curious, and enjoys the advantage of a good horizon, might, with little trouble, make two heliotropes; the one for the winter, the other for the summer solstice: and the two erections might be constructed with very little expense; for two pieces of timber frame-work, about ten or twelve feet high, and four feet broad at the base, and close lined with plank, would answer the purpose.

The erection for the former should, if possible, be placed within sight of some window in the common sitting-parlour; because men, at that dead season of the year, are usually within doors at the close of the day; while that for the latter might be fixed for any given spot in the garden or outlet; whence the owner

might contemplate, in a fine summer's evening, the utmost extent that the sun makes to the northward at the season of the longest days. Now nothing would be necessary but to place these two objects with so much exactness, that the westerly limb of the sun, at setting, might but just clear the winter heliotrope to the west of it on the shortest day; and that the whole disc of the sun, at the longest day, might exactly at setting also clear the summer heliotrope to the north of it.

By this simple expedient it would soon appear that there is no such thing, strictly speaking, as a solstice; for, from the shortest day, the owner would, every clear evening, see the disc advancing at its setting, to the westward of the object; and, from the longest day, observe the sun retiring backwards every evening at its setting, towards the object westward, till, in a few nights, it would set quite behind it, and so by degrees, to the west of it; for, when the sun comes near the summer solstice, the whole disc of it would at first set behind the object; after a time the northern limb would first appear, and so every night gradually more, till at length the whole diameter would set northward of it for about three nights; but on the middle night of the three, sensibly more remote than the former or following. When beginning its recess from the summer tropic, it would continue more and more to be

hidden every night, till at length it would descend quite behind the object again; and so nightly more and more to the westward.

LETTER XLV.

"——Mugire videbis
Sub pedibus terram, et descendere montibus ornos.

SELBORNE.

WHEN I was a boy I used to read, with astonishment and implicit assent, accounts in "Baker's Chronicle" of walking hills and travelling mountains. John Philips, in his "Cyder," alludes to the credit that was given to such stories with a delicate but quaint vein of humour peculiar to the author of the "Splendid Shilling."

"I nor advise, nor reprehend the choice
Of Marcely Hill; the apple nowhere finds
A kinder mould; yet 'tis unsafe to trust
Deceitful ground; who knows but that once more
This mount may journey, and his present site
Forsaken, to thy neighbour's bounds transfer
Thy goodly plants, affording matter strange
For law debates?"

But, when I came to consider better, I began to

suspect that though our hills may never have journeyed far, yet that the ends of many of them have slipped and fallen away at distant periods, leaving the cliffs bare and abrupt. This seems to have been the case with Nore and Whetham Hills; and especially with the ridge between Harteley Park and Ward-le-Ham, where the ground has slid into vast swellings and furrows; and lies still in such romantic confusion as cannot be accounted for from any other cause. A strange event, that happened not long since, justifies our suspicions; which, though it befell not within the limits of this parish, yet as it was within the hundred of Selborne, and as the circumstances were singular, may fairly claim a place in a work of this nature.

The months of January and February, in the year 1774, were remarkable for great melting snows and vast gluts of rain; so that by the end of the latter month the land-springs, or lavants, began to prevail, and to be near as high as in the memorable winter of 1764. The beginning of March also went on in the same tenor; when, in the night between the 8th and 9th of that month, a considerable part of the great woody hanger at Hawkley was torn from its place, and fell down, leaving a high freestone cliff naked and bare, and resembling the steep side of a chalk-pit. It appears that this huge fragment, being perhaps sapped and undermined by waters, foundered, and was in-

gulfed, going down in a perpendicular direction; for a gate which stood in the field, on the top of the hill, after sinking with its post for thirty or forty feet, remained in so true and upright a position as to open and shut with great exactness, just as in its first situation. Several oaks also are still standing, and in a state of vegetation, after taking the same desperate leap. That great part of this prodigious mass was absorbed in some gulf below, is plain also from the inclining ground at the bottom of the hill, which is free and unincumbered; but would have been buried in heaps of rubbish, had the fragment parted and fallen forward. About a hundred yards from the foot of this hanging coppice stood a cottage by the side of a lane; and two hundred yards lower, on the other side of the lane, was a farm-house, in which lived a labourer and his family; and, just by, a stout new barn. The cottage was inhabited by an old woman and her son, and his wife. These people in the evening, which was very dark and tempestuous, observed that the brick floors of their kitchens began to heave and part; and that the walls seemed to open, and the roofs to crack; but they all agree that no tremor of the ground, indicating an earthquake, was ever felt; only that the wind continued to make a most tremendous roaring in the woods and hangers. The miserable inhabitants, not daring to go to bed, remained in the utmost solicitude

and confusion, expecting every moment to be buried under the ruins of their shattered edifices. When daylight came they were at leisure to contemplate the devastations of the night: they then found that a deep rift, or chasm, had opened under their houses, and torn them, as it were, in two; and that one end of the barn had suffered in a similar manner: that a pond near the cottage had undergone a strange reverse, becoming deep at the shallow end, and so *vice versâ*; that many large oaks were removed out of their perpendicular, some thrown down, and some fallen into the heads of neighbouring trees; and that a gate was thrust forward, with its edge, full six feet, so as to require a new track to be made to it. From the foot of the cliff the general course of the ground, which is pasture, inclines in a moderate descent for half a mile, and is interspersed with some hillocks, which were rifted, in every direction, as well towards the great woody hanger, as from it. In the first pasture the deep clefts began; and running across the lane, and under the buildings, made such vast shelves that the road was impassable for some time: and so over to an arable field on the other side, which was strangely torn and disordered. The second pasture-field, being more soft and springy, was protruded forward without many fissures in the turf, which was raised in long ridges resembling graves, lying at right angles to the motion. At the bottom of

this enclosure the soil and turf rose many feet against the bodies of some oaks that obstructed their farther course, and terminated this awful commotion.

The perpendicular height of the precipice in general is twenty-three yards; the length of the lapse or slip as seen from the fields below, one hundred and eighty-one; and a partial fall, concealed in the coppice, extends seventy yards more; so that the total length of this fragment that fell was two hundred and fifty-one yards. About fifty acres of land suffered from this violent convulsion; two houses were entirely destroyed; one end of a new barn was left in ruins, the walls being cracked through the very stones that composed them; a hanging coppice was changed to a naked rock; and some grass grounds and an arable field so broken and rifted by the chasms as to be rendered for a time neither fit for the plough nor safe for pasturage, till considerable labour and expense had been bestowed in levelling the surface and filling in the gaping fissures.

LETTER XLVI.

"——resonant arbusta——."

SELBORNE.

THERE is a steep abrupt pasture field and interspersed with furze close to the back of this village, well known by the name of Short Lithe, consisting of a rocky dry soil, and inclining to the afternoon sun. This spot abounds with the *gryllus campestris*, or field-cricket; which, though frequent in these parts, is by no means a common insect in many other counties.

As their cheerful summer cry cannot but draw the attention of a naturalist, I have often gone down to examine the economy of these *grylli*, and study their mode of life; but they are so shy and cautious that it is no easy matter to get a sight of them; for feeling a person's footsteps as he advances, they stop short in the midst of their song, and retire backward nimbly into their burrows, where they lurk till all suspicion of danger is over.

At first we attempted to dig them out with a spade, but without any great success; for either we could not get to the bottom of the hole, which often terminated under a great stone; or else in breaking up the ground we inadvertently squeezed the poor insect to death. Out of one so bruised we took a multitude of eggs,

which were long and narrow, of a yellow colour, and covered with a very tough skin. By this accident we learned to distinguish the male from the female; the former of which is shining black, with a golden stripe across his shoulders; the latter is more dusky, more capacious about the abdomen, and carries a long sword-shaped weapon at her tail, which probably is the instrument with which she deposits her eggs in crannies and safe receptacles.

Where violent methods will not avail, more gentle means will often succeed, and so it proved in the present case; for, though a spade be too boisterous and rough an implement, a pliant stalk of grass, gently insinuated into the caverns, will probe their windings to the bottom, and quickly bring out the inhabitant; and thus the humane inquirer may gratify his curiosity without injuring the object of it. It is remarkable, that though these insects are furnished with long legs behind, and brawny thighs for leaping, like grasshoppers; yet when driven from their holes they show no activity, but crawl along in a shiftless manner, so as easily to be taken; and again, though provided with a curious apparatus of wings, yet they never exert them when there seems to be the greatest occasion. The males only make that shrilling noise, perhaps, out of rivalry and emulation, as is the case with many animals which exert some sprightly note during their

breeding-time. It is raised by a brisk friction of one wing against the other. They are solitary beings, living singly male and female, each as it may happen; but there must be a time when the sexes have some intercourse, and then the wings may be useful perhaps during the hours of night. When the males meet they will fight fiercely, as I found by some which I put into the crevices of a dry stone wall, where I should have been glad to have made them settle. For though they seemed distressed by being taken out of their knowledge, yet the first that got possession of the chinks would seize on any other that were intruded upon them with a vast row of serrated fangs. With their strong jaws, toothed like the shears of a lobster's claws, they perforate and round their curious regular cells, having no fore-claws to dig, like the mole-cricket. When taken in hand I could not but wonder that they never offered to defend themselves, though armed with such formidable weapons. Of such herbs as grow before the mouths of their burrows they eat indiscriminately, and on a little platform which they make just by, they drop their dung; and never, in the day time, seem to stir more than two or three inches from home. Sitting in the entrance of their caverns they chirp all night as well as day from the middle of the month of May to the middle of July; and in hot weather, when they are most vigorous, they make the

hills echo, and in the stiller hours of darkness may be heard to a considerable distance. In the beginning of the season their notes are more faint and inward; but become louder as the summer advances, and so die away again by degrees.

Sounds do not always give us pleasure according to their sweetness and melody, nor do harsh sounds always displease. We are more apt to be captivated or disgusted with the associations which they promote than with the notes themselves. Thus the shrilling of the field-cricket, though sharp and stridulous, yet marvellously delights some hearers, filling their minds with a train of summer ideas of everything that is rural, verdurous, and joyous.

About the 10th March the crickets appear at the mouths of their cells, which they then open and bore, and shape very elegantly. All that ever I have seen at that season were in their pupa state, and had only the rudiments of wings, lying under a skin or coat, which must be cast before the insect can arrive at its perfect state, from whence I should suppose that the old ones of last year do not always survive the winter. In August their holes begin to be obliterated, and the insects are seen no more till spring.

Not many summers ago I endeavoured to transplant a colony to the terrace in my garden, by boring deep

holes in the sloping turf. The new inhabitants stayed some time, and fed and sung, but wandered away by degrees, and were heard at a farther distance every morning, so that it appears that on this emergency they made use of their wings in attempting to return to the spot from which they were taken.

One of these crickets, when confined in a paper cage and set in the sun, and supplied with plants moistened with water, will feed and thrive, and become so merry and loud as to be irksome in the same room where a person is sitting; if the plants are not wetted it will die.

LETTER XLVII.

"Far from all resort of mirth
Save the cricket on the hearth."
MILTON'S *Il Penseroso*.

SELBORNE.

DEAR SIR,—While many other insects must be sought after in fields, and woods, and waters, the *gryllus domesticus*, or house-cricket, resides altogether within our dwellings, intruding itself upon our notice whether we will or no. This species delights in new-built houses, being, like the spider, pleased with the moisture

of the walls; and besides, the softness of the mortar enables them to burrow and mine between the joints of the bricks or stones, and to open communications from one room to another. They are particularly fond of kitchens and bakers' ovens, on account of their perpetual warmth.

Tender insects that live abroad either enjoy only the short period of one summer, or else doze away the cold uncomfortable months in profound slumbers; but these, residing as it were in a torrid zone, are always alert and merry—a good Christmas fire is to them like the heats of the dog-days. Though they are frequently heard by day, yet is their natural time of motion only in the night. As soon as it grows dusk, the chirping increases, and they come running forth, and are from the size of a flea to that of their full stature. As one should suppose, from the burning atmosphere which they inhabit, they are a thrifty race, and show a great propensity for liquids, being found frequently drowned in pans of water, milk, broth, or the like. Whatever is moist they affect; and therefore often gnaw holes in wet woollen stockings and aprons that are hung to the fire. They are the housewife's barometer, foretelling her when it will rain, and are prognostic sometimes she thinks of ill or good luck, of the death of a near relation, or the approach of an absent lover. By being

the constant companions of her solitary hours, they naturally become the objects of her superstition. These crickets are not only very thrifty, but very voracious; for they will eat the scummings of pots, and yeast, salt, and crumbs of bread, and any kitchen offal or sweepings. In the summer we have observed them to fly when it became dusk out of the windows and over the neighbouring roofs. This feat of activity accounts for the sudden manner in which they often leave their haunts, as it does for the method by which they come to houses where they were not known before. It is remarkable that many sorts of insects seem never to use their wings but when they have a mind to shift their quarters and settle new colonies. When in the air they move "*volatu undoso*," in waves or curves, like wood-peckers, opening and shutting their wings at every stroke, and so are always rising or sinking.

When they increase to a great degree, as they did once in the house where I am now writing, they become noisome pests, flying into the candles, and dashing into people's faces; but may be blasted and destroyed by gunpowder discharged into their crevices and crannies. In families at such times they are like Pharaoh's plague of frogs—"in their bedchambers, and upon their beds, and in their ovens, and in their

kneading troughs." Their shrilling noise is occasioned by a brisk attrition of their wings. Cats catch hearth-crickets, and, playing with them as they do with mice, devour them. Crickets may be destroyed, like wasps, by phials half filled with beer, or any liquid, and set in their haunts; for being always eager to drink, they will crowd in till the bottles are full.

LETTER XLVIII.

SELBORNE.

How diversified are the modes of life, not only of incongruous, but even of congenerous animals; and yet their specific distinctions are not more various than their propensities. Thus, while the field-cricket delights in sunny dry banks, and the house-cricket rejoices amidst the glowing heat of the kitchen hearth or oven, the *gryllus grylla talpa* (the mole-cricket), haunts moist meadows, and frequents the sides of ponds and banks of streams, performing all its functions in a swampy wet soil. With a pair of fore-feet, curiously adapted to the purpose, it burrows and works under ground like the mole, raising a ridge as it proceeds, but seldom throwing up hillocks.

As mole-crickets often infest gardens by the sides of canals, they are unwelcome guests to the gardener, raising up ridges in their subterraneous progress, and rendering the walks unsightly. If they take to the kitchen quarters they occasion great damage among the plants and roots, by destroying whole beds of cabbages, young legumes, and flowers. When dug out they seem very slow and helpless, and make no use of their wings by day, but at night they come abroad, and make long excursions, as I have been convinced by finding stragglers in a morning, in improbable places. In fine weather, about the middle of April, and just at the close of day, they begin to solace themselves with a low, dull, jarring note, continued for a long time without interruption, and not unlike the chattering of the fern-owl, or goat-sucker, but more inward.

About the beginning of May they lay their eggs, as I was once an eye-witness; for a gardener at a house where I was on a visit, happening to be mowing, on the 6th of that month, by the side of a canal, his scythe struck too deep, pared off a large piece of turf, and laid open to view a curious scene of domestic economy:—

> "———Ingentem lato dedit ore fenestram:
> Apparet domus intus, et atria longa patescunt:
> Apparent——penetralia."

There were many caverns and winding passages leading to a kind of chamber, neatly smoothed and rounded, and about the size of a moderate snuff-box. Within this secret nursery were deposited near a hundred eggs of a dirty yellow colour, and enveloped in a tough skin, but too lately excluded to contain any rudiments of young, being full of a viscous substance. The eggs lay but shallow, and within the influence of the sun, just under a little heap of fresh-mowed mould, like that which is raised by ants.

When mole-crickets fly they move "*cursu undoso*," rising and falling in curves, like the other species mentioned before. In different parts of this kingdom people call them fen-crickets, churr-worms, and eve-churrs, all very apposite names.

Anatomists, who have examined the intestines of these insects, astonish me with their accounts; for they say that, from the structure, position, and number of their stomachs, or maws, there seems to be good reason to suppose that this and the two former species ruminate or chew the cud like many quadrupeds!

LETTER XLIX.

SELBORNE, *May 7th*, 1779.

IT is now more than forty years that I have paid some attention to the ornithology of this district, without being able to exhaust the subject: new occurrences still arise as long as any inquiries are kept alive.

In the last week of last month five of those most rare birds, too uncommon to have obtained an English name, but known to naturalists by the terms of *himantopus*, or *loripes*, and *charadrius himantopus*, were shot upon the verge of Frimsham pond, a large lake belonging to the Bishop of Winchester, and lying between Wolmer forest and the town of Farnham, in the county of Surrey. The pond-keeper says there were three brace in the flock: but that, after he had satisfied his curiosity, he suffered the sixth to remain unmolested. One of these specimens I procured, and found the length of the legs to be so extraordinary, that, at first sight, one might have supposed the shanks had been fastened on to impose on the credulity of the beholder: they were legs in *caricatura*, and had we seen such proportions on a Chinese or Japan screen, we should

have made large allowances for the fancy of the draughtsman. These birds are of the plover family, and might with propriety be called the stilt plovers. Brisson, under that idea, gives them the apposite name of *l'echasse*. My specimen, when drawn and stuffed with pepper, weighed only four ounces and a quarter, though the naked part of the thigh measured three inches and a half, and the legs four inches and a half. Hence we may safely assert that these birds exhibit, weight for inches, incomparably the greatest length of legs of any known bird. The flamingo, for instance, is one of the most long-legged birds, and yet it bears no manner of proportion to the *himantopus*; for a cock flamingo weighs, at an average, about four pounds avoirdupois, and his legs and thighs measure usually about twenty inches. But four pounds are fifteen times and a fraction more than four ounces and one quarter; and if four ounces and a quarter have eight inches of legs, four pounds must have one hundred and twenty inches and a fraction of legs—viz., somewhat more than ten feet; such a monstrous proportion as the world never saw! If you should try the experiment in still larger birds, the disparity would still increase. It must be matter of great curiosity to see the stilt plover move—to observe how it can wield such a length of lever with such feeble muscles as the

thighs seem to be furnished with. At best one should expect it to be but a bad walker: but what adds to the wonder is, that it has no back toe. Now without that steady prop to support its steps it must be liable, in speculation, to perpetual vacillations, and seldom able to preserve the true centre of gravity.

The old name of *himantopus* is taken from Pliny, and, by an awkward metaphor, implies that the legs are as slender and pliant as if cut out of a thong of leather. Neither Willughby nor Ray, in all their curious researches, either at home or abroad, ever saw this bird. Mr. Pennant never met with it in all Great Britain, but observed it often in the cabinets of the curious at Paris. Hasselquist says that it migrates to Egypt in the autumn, and a most accurate observer of Nature has assured me that he has found it on the banks of the streams in Andalusia.

Our writers record it to have been found only twice in Great Britain. From all these relations it plainly appears that these long-legged plovers are birds of South Europe, and rarely visit our island, and when they do, are wanderers and stragglers, and impelled to make so distant and northern an excursion from motives or accidents for which we are not able to account. One thing may fairly be deduced, that these birds come over to us from the continent, since nobody

can suppose that a species not noticed once in an age, and of such a remarkable make, can constantly breed unobserved in this kingdom.

LETTER L.

SELBORNE, *April* 21*st*, 1780.

DEAR SIR,—The old Sussex tortoise, that I have mentioned to you so often, is become my property. I dug it out of its winter dormitory in March last, when it was enough awakened to express its resentments by hissing, and, packing it in a box with earth, carried it eighty miles in post-chaises. The rattle and hurry of the journey so perfectly roused it that, when I turned it out on a border, it walked twice down to the bottom of my garden; however, in the evening, the weather being cold, it buried itself in the loose mould, and continues still concealed.

As it will be under my eye, I shall now have an opportunity of enlarging my observations on its mode of life and propensities, and perceive already that, towards the time of coming forth, it opens a breathing place in the ground near its head, requiring, I conclude, a freer respiration as it becomes more alive.

This creature not only goes under the earth from the middle of November to the middle of April, but sleeps great part of the summer: for it goes to bed in the longest days at four in the afternoon, and often does not stir in the morning till late. Besides, it retires to rest for every shower, and does not move at all in wet days.

When one reflects on the state of this strange being, it is a matter of wonder to find that Providence should bestow such a profusion of days, such a seeming waste of longevity, on a reptile that appears to relish it so little as to squander more than two-thirds of its existence in a joyless stupor, and be lost to all sensation for months together in the profoundest of slumbers.

While I was writing this letter, a moist and warm afternoon, with the thermometer at 50°, brought forth troops of shell-snails, and, at the same juncture, the tortoise heaved up the mould and put out its head, and the next morning came forth, as it were, raised from the dead; and walked about till four in the afternoon. This was a curious coincidence! a very amusing occurrence! to see such a similarity of feelings between the two φιλάκια! for so the Greeks called both the shell-snail and the tortoise.

Summer birds are, this cold and backward spring,

unusually late: I have seen but one swallow yet. This conformity with the weather convinces me more and more that they sleep in the winter.

LETTER LI.

SELBORNE, *Sept. 3rd*, 1781.

I HAVE now read your miscellanies through with much care and satisfaction; and am to return you my best thanks for the honourable mention made in them of me as a naturalist, which I wish I may deserve.

In some former letters I expressed my suspicions that many of the house-martins do not depart in the winter far from this village. I therefore determined to make some search about the south-east end of the hill, where I imagined they might slumber out the uncomfortable months of winter. But supposing that the examination would be made to the best advantage in the spring, and observing that no martins had appeared by the 11th April last, on that day I employed some men to explore the shrubs and cavities of the suspected spot. The persons took pains, but without any success; however, a remarkable incident occurred in the midst of our pursuit: while the

labourers were at work, a house-martin, the first that had been seen this year, came down the village in the sight of several people, and went at once into a nest, where it stayed a short time, and then flew over the houses; for some days after no martins were observed, not till the 16th April, and then only a pair. Martins in general were remarkably late this year.

LETTER LII.

SELBORNE, *Sept. 9th*, 1781.

I HAVE just met with a circumstance respecting swifts, which furnishes an exception to the whole tenor of my observations ever since I have bestowed any attention on that species of hirundines. Our swifts, in general, withdrew this year about the first day of August, all save one pair, which in two or three days was reduced to a single bird. The perseverance of this individual made me suspect that the strongest of motives, that of an attachment to her young, could alone occasion so late a stay. I watched therefore till the 24th August, and then discovered that, under the eaves of the church, she attended upon two young, which were fledged, and

now put out their white chins from a crevice. These remained till the 27th, looking more alert every day, and seeming to long to be on the wing. After this day they were missing at once; nor could I ever observe them with their dam coursing round the church in the act of learning to fly, as the first broods evidently do. On the 31st I caused the eaves to be searched, but we found in the nest only two callow dead, stinking swifts, on which a second nest had been formed. This double nest was full of the black shining cases of the *hippoboscæ hirundinis*.

The following remarks on this unusual incident are obvious. The first is, that though it may be disagreeable to swifts to remain beyond the beginning of August, yet that they can subsist longer is undeniable. The second is, that this uncommon event, as it was owing to the loss of the first brood, so it corroborates my former remark, that swifts breed regularly but once; since, was the contrary the case, the occurrence above could neither be new nor rare.

P.S.—One swift was seen at Lyndon, in the county of Rutland, in 1782, so late as the 3rd September.

LETTER LIII.

As I have sometimes known you make inquiries about several kinds of insects, I shall here send you an account of one sort which I little expected to have found in this kingdom. I had often observed that one particular part of a vine growing on the walls of my house was covered in the autumn with a black dust-like appearance, on which the flies fed eagerly; and that the shoots and leaves thus affected did not thrive; nor did the fruit ripen. To this substance I applied my glasses; but could not discover that it had anything to do with animal life, as I at first expected: but, upon a closer examination behind the larger boughs, we were surprised to find that they were coated over with husky shells, from whose sides proceeded a cotton-like substance, surrounding a multitude of eggs. This curious and uncommon production put me upon recollecting what I have heard and read concerning the *coccus vitis viniferæ* of Linnæus, which, in the south of Europe, infests many vines, and is a horrid and loathsome pest. As soon as I had turned to the accounts given of this insect, I saw at once that it

swarmed on my vine; and did not appear to have been at all checked by the preceding winter, which had been uncommonly severe.

Not being then at all aware that it had anything to do with England, I was much inclined to think that it came from Gibraltar among the many boxes and packages of plants and birds which I had formerly received from thence; and especially as the vine infested grew immediately under my study-window, where I usually kept my specimens. True it is that I had received nothing from thence for some years: but as insects, we know, are conveyed from one country to another in a very unexpected manner, and have a wonderful power of maintaining their existence till they fall into a nidus proper for their support and increase, I cannot but suspect still that these cocci came to me originally from Andalusia. Yet, all the while, candour obliges me to confess that Mr. Lightfoot has written me word that he once, and but once, saw these insects on a vine at Weymouth in Dorsetshire; which, it is here to be observed, is a seaport town to which the coccus might be conveyed by shipping.

As many of my readers may possibly never have heard of this strange and unusual insect, I shall here transcribe a passage from a natural history of Gibraltar,

written by the Reverend John White, late vicar of Blackburn in Lancashire, but not yet published :—

"In the year 1770 a vine, which grew on the east side of my house, and which had produced the finest crops of grapes for years past, was suddenly overspread on all the woody branches with large lumps of a white fibrous substance resembling spiders' webs, or rather raw cotton. It was of a very clammy quality, sticking fast to everything that touched it, and capable of being spun into long threads. At first I suspected it to be the product of spiders, but could find none. Nothing was to be seen connected with it but many brown oval husky shells, which by no means looked like insects, but rather resembled bits of the dry bark of the vine. The tree had a plentiful crop of grapes set, when this pest appeared upon it; but the fruit was manifestly injured by this foul encumbrance. It remained all the summer, still increasing, and loaded the woody and bearing branches to a vast degree. I often pulled off great quantities by handfuls; but it was so slimy and tenacious that it could by no means be cleared. The grapes never filled to their natural perfection, but turned watery and vapid. Upon perusing the works afterwards of M. de Reaumur, I found this matter perfectly described and accounted for. Those husky shells, which I had observed, were no other

than the female coccus, from whose side this cotton-like substance exudes, and serves as a covering and security for their eggs."

To this account I think proper to add, that, though the female cocci are stationary, and seldom remove from the place to which they stick, yet the male is a winged insect; and that the black dust which I saw was undoubtedly the excrement of the females, which is eaten by ants as well as flies. Though the utmost severity of our winter did not destroy these insects, yet the attention of the gardener in a summer or two has entirely relieved my vine from this filthy annoyance.

As we have remarked above that insects are often conveyed from one country to another in a very unaccountable manner, I shall here mention an emigration of small aphides, which was observed in the village of Selborne no longer ago than August 1st, 1785.

About three o'clock in the afternoon of that day, which was very hot, the people of this village were surprised by a shower of aphides, or smother-flies, which fell in these parts. Those that were walking in the street at that juncture found themselves covered with these insects, which settled also on the hedges and gardens, blackening all the vegetables where they

alighted. My annuals were discoloured with them, and the stalks of a bed of onions were quite coated over for six days after. These armies were then, no doubt, in a state of emigration, and shifting their quarters; and might have come, as far as we know, from the great hop plantations of Kent or Sussex, the wind being all that day in the easterly quarter. They were observed at the same time in great clouds about Farnham, and all along the vale from Farnham to Alton.

LETTER LIV.

DEAR SIR,—When I happen to visit a family where gold and silver fishes are kept in a glass bowl, I am always pleased with the occurrence, because it offers me an opportunity of observing the actions and propensities of those beings with whom we can be little acquainted in their natural state. Not long since I spent a fortnight at the house of a friend where there was such a vivary, to which I paid no small attention, taking every occasion to remark what passed within its narrow limits. It was here that I first observed the manner in which fishes die. As soon as the

creature sickens, the head sinks lower and lower, and it stands as it were on its head; till, getting weaker, and losing all poise, the tail turns over, and at last it floats on the surface of the water with its belly uppermost. The reason why fishes, when dead, swim in that manner is very obvious; because, when the body is no longer balanced by the fins of the belly, the broad muscular back preponderates by its own gravity, and turns the belly uppermost, as lighter from its being a cavity, and because it contains the swimming-bladders, which contribute to render it buoyant. Some that delight in gold and silver fishes have adopted a notion that they need no aliment. True it is that they will subsist for a long time without any apparent food but what they can collect from pure water frequently changed; yet they must draw some support from animalcula, and other nourishment supplied by the water; because, though they seem to eat nothing, yet the consequences of eating often drop from them. That they are best pleased with such *jejune* diet may easily be confuted, since if you toss them crumbs they will seize them with great readiness, not to say greediness; however, bread should be given sparingly, lest, turning sour, it corrupt the water. They will also feed on the water-plant called *lemna* (ducks' meat), and also on small fry.

When they want to move a little, they gently protrude themselves with their *pinnæ pectorales*; but it is with their strong muscular tails only that they and all fishes shoot along with such inconceivable rapidity. It has been said that the eyes of fishes are immovable; but these apparently turn them forward or backward in their sockets as occasions require. They take little notice of a lighted candle, though applied close to their heads, but flounce and seem much frightened by a sudden stroke of the hand against the support whereon the bowl is hung; especially when they have been motionless, and are perhaps asleep. As fishes have no eyelids, it is not easy to discern when they are sleeping or not, because their eyes are always open.

Nothing can be more amusing than a glass bowl containing such fishes; the double refractions of the glass and water represent them, when moving, in a shifting and changeable variety of dimensions, shades, and colours; while the two mediums, assisted by the concavo-convex shape of the vessel, magnify and distort them vastly; not to mention that the introduction of another element and its inhabitants into our parlours engages the fancy in a very agreeable manner.

Gold and silver fishes, though originally natives of China and Japan, yet are become so well reconciled to our climate as to thrive and multiply very fast in our

ponds and stews. Linnæus ranks this species of fish under the genus of *cyprinus*, or carp, and calls it *cyprinus auratus*.

Some people exhibit this sort of fish in a very fanciful way; for they cause a glass bowl to be blown with a large hollow space within, that does not communicate with it. In this cavity they put a bird occasionally; so that you may see a goldfinch or a linnet hopping as it were in the midst of the water, and the fishes swimming in a circle round it. The simple exhibition of the fishes is agreeable and pleasant: but in so complicated a way becomes whimsical and unnatural, and liable to the objection due to him.

"Qui variare cupit rem prodigialitér unam."

I am, etc.

LETTER LV.

October 10*th*, 1781.

DEAR SIR,—I think I have observed before that much of the most considerable part of the house-martins withdraw from hence about the first week in October, but that some, the latter broods I am now

convinced, linger on till towards the middle of that month; and that at times, once perhaps in two or three years, a flight, for one day only, has shown itself in the first week in November.

Having taken notice, in October, 1780, that the last flight was numerous, amounting perhaps to one hundred and fifty; and that the season was soft and still, I was resolved to pay uncommon attention to these late birds; to find, if possible, where they roosted, and to determine the precise time of their retreat. The mode of life of these latter *hirundines* is very favourable to such a design, for they spend the whole day in the sheltered district, between me and the Hanger, sailing about in a placid, easy manner, and feasting on those insects which love to haunt a spot so secure from ruffling winds. As my principal object was to discover the place of their roosting, I took care to wait on them before they retired to rest, and was much pleased to find that for several evenings together, just at a quarter past five in the afternoon, they all scudded away in great haste towards the south-east, and darted down among the low shrubs above the cottages at the end of the hill. This spot, in many respects, seemed to be well calculated for their winter residence; for in many parts it is as steep as the roof of any house, and therefore secure from the annoyances of water; and it

is moreover clothed with beechen shrubs, which, being stunted and bitten by sheep, make the thickest covert imaginable, and are so entangled as to be impervious to the smallest spaniel; besides, it is the nature of underwood beech never to cast its leaf all the winter, so that, with the leaves on the ground and those on the twigs, no shelter can be more complete. I watched them on the 13th and 14th October, and found their evening retreat was exact and uniform; but after this they made no regular appearance. Now and then a straggler was seen, and on the 22nd October, I observed two in the morning over the village, and with them my remarks for the season ended.

From all these circumstances put together, it is more than probable that this lingering flight, at so late a season of the year, never departed from the island. Had they indulged me that autumn with a November visit, as I much desired, I presume that, with proper assistants, I should have settled the matter past all doubt; but though the 3rd November was a sweet day, and in appearance exactly suited to my wishes, yet not a martin was to be seen; and so I was forced, reluctantly, to give up the pursuit.

I have only to add that were the bushes, which cover some acres, and are not my own property, to be grubbed and carefully examined, probably those late broods, and

perhaps the whole aggregate body of the house-martins of this district, might be found there, in different secret dormitories; and that, so far from withdrawing into warmer climes, it would appear that they never depart three hundred yards from the village.

LETTER LVI.

THEY who write on natural history cannot too frequently advert to instinct, that wonderful limited faculty, which in some instances raises the brute creation, as it were, above reason, and in others leaves them so far below it. Philosophers have defined instinct to be that secret influence by which every species is compelled naturally to pursue, at all times, the same way or track, without any teaching or example; whereas reason, without instruction, would often vary and do that by many methods which instinct effects by one alone. Now this maxim must be taken in a qualified sense; for there are instances in which instinct does vary and conform to the circumstances of place and convenience.

It has been remarked that every species of bird has a mode of nidification peculiar to itself, so that a

schoolboy would at once pronounce on the sort of nest before him. This is the case among fields and woods, and wilds, but, in the villages round London, where mosses and gossamer, and cotton from vegetables, are hardly to be found, the nest of the chaffinch has not that elegant finished appearance, nor is it so beautifully studded with lichens, as in a more rural district; and the wren is obliged to construct its house with straws and dry grasses, which do not give it that rotundity and compactness so remarkable in the edifices of that little architect. Again, the regular nest of the house-martin is hemispheric; but where a rafter, or a joist, or a cornice, may happen to stand in the way, the nest is so contrived as to conform to the obstruction, and becomes flat or compressed.

In the following instances instinct is perfectly uniform and consistent. There are three creatures, the squirrel, the field-mouse, and the bird called the nut-hatch (*sitta Europæa*), which live much on hazel-nut; and yet they open them each in a different way. The first, after rasping off the small end, splits the shell in two with his long fore-teeth, as a man does with his knife; the second nibbles a hole with his teeth, so regular as if drilled with a wimble, and yet so small that one could wonder how the kernel can be extracted through it; while the last picks an irregular

ragged hole with its bill: but as this artist has no paws to hold the nut firm while he pierces it, like an adroit workman, he fixes it, as it were, in a vice, in some cleft of a tree, or in some crevice; when standing over it, he perforates the stubborn shell. We have often placed nuts in the chink of a gate-post where nut-hatches have been known to haunt, and have always found that those birds have readily penetrated them. While at work they make a rapping noise that may be heard at a considerable distance.

You that understand both the theory and practical part of music may best inform us why harmony or melody should so strangely assist some men, as it were by recollection, for days after the concert is over. What I mean the following passage will most readily explain:—

"Præhabebat porrò vocibus humanis, instrumentisque harmonicis musicam illam avium: non quod aliâ quoque non delectaretur: sed quod ex musicâ humanâ relinqueretur in animo continens quædam, attentionemque et somnum conturbans agitatio; dum ascensus, exscensus, tenores, ac mutationes illæ sonorum, et consonantiarum euntque, redeuntque per phantasiam:—cum nihil tale relinqui possit ex modulationibus avium, quæ, quod non sunt perinde a nobis imitabiles, non

possunt perinde internam facultatem commovere."—*Gassendus in Vitâ Peireskii.*

This curious quotation strikes me much by so well representing my own case, and by describing what I have so often felt, but never could so well express. When I hear fine music I am haunted with passages therefrom night and day; and especially at first waking, which, by their importunity, give me more uneasiness than pleasure; elegant lessons still tease my imagination, and recur irresistibly to my recollection at seasons, and even when I am desirous of thinking of more serious matters.

I am, etc.

LETTER LVII.

A RARE, and I think a new, little bird frequents my garden, which I have great reason to think is the pettichaps: it is common in some parts of the kingdom; and I have received formerly several dead specimens from Gibraltar. This bird much resembles the whitethroat, but has a more white or rather silvery breast and belly; is restless and active, like the willow-wrens, and hops from bough to bough, examining every part

for food; it also runs up the stems of the crown-imperials, and, putting its head into the bells of those flowers, sips the liquor which stands in the nectarium of each petal. Sometimes it feeds on the ground like the hedge-sparrow, by hopping about on the grass-plots and mown-walks.

One of my neighbours, an intelligent and observing man, informs me that, in the beginning of May, and about ten minutes before eight o'clock in the evening, he discovered a great cluster of house-swallows, thirty, at least, he supposes, perching on a willow that hung over the verge of James Knight's upper-pond. His attention was first drawn by the twittering of these birds, which sat motionless in a row on the bough, with their heads all one way, and, by their weight, pressing down the twig so that it nearly touched the water. In this situation he watched them till he could see no longer. Repeated accounts of this sort, spring and fall, induce us greatly to suspect that house-swallows have some strong attachment to water, independent of the matter of food; and, though they may not retire into that element, yet they may conceal themselves in the banks of pools and rivers during the uncomfortable months of winter.

One of the keepers of Wolmer Forest sent me a peregrine-falcon, which he shot on the verge of that district

as it was devouring a wood-pigeon. The *falco peregrinus*, or haggard-falcon, is a noble species of hawk seldom seen in the southern counties. In winter 1767, one was killed in the neighbouring parish of Farringdon, and sent by me to Mr. Pennant into North Wales. Since that time I have met with none till now. The specimen mentioned above was in fine preservation, and not injured by the shot: it measured forty-two inches from wing to wing, and twenty-one from beak to tail, and weighed two pounds and a half standing weight. This species is very robust, and wonderfully formed for rapine; its breast was plump and muscular; its thighs long, thick, and brawny; and its legs remarkably short and well set: the feet were armed with most formidable, sharp, long talons: the eyelids and cere of the bill were yellow; but the irides of the eyes dusky; the beak was thick and hooked, and of a dark colour, and had a jagged process near the end of the upper mandible on each side: its tail, or train, was short in proportion to the bulk of its body; yet the wings, when closed, did not extend to the end of the train. From its large and fair proportions it might be supposed to have been a female; but I was not permitted to cut open the specimen. For one of the birds of prey, which are usually lean, this was in high case: in its craw were many barley-corns, which probably

came from the crop of the wood-pigeon, on which it was feeding when shot; for voracious birds do not eat grain, but, when devouring their quarry, with undistinguishing vehemence swallow bones and feathers, and all matters indiscriminately. This falcon was probably driven from the mountains of North Wales or Scotland, where they are known to breed, by rigorous weather and deep snows that had lately fallen.

I am, etc.

LETTER LVIII.

My near neighbour, a young gentleman in the service of the East India Company, has brought home a dog and a bitch of the Chinese breed from Canton, such as are fattened in that country for the purpose of being eaten: they are about the size of a moderate spaniel; of a pale yellow colour, with coarse bristling hairs on their backs; sharp upright ears, and peaked heads, which give them a very fox-like appearance. Their hind legs are unusually straight, without any bend at the hock or ham, to such a degree as to give them an awkward gait when they trot. When they are in motion their tails are curved high over their backs like those of some hounds, and have a bare place each on the out-

side from the tip midway, that does not seem to be matter of accident, but somewhat singular. Their eyes are jet-black, small, and piercing; the insides of their lips and mouths of the same colour, and their tongues blue. The bitch has a dew-claw on each hind leg; the dog has none. When taken out into a field the bitch showed some disposition for hunting, and dwelt on the scent of a covey of partridges till she sprung them, giving her tongue all the time. The dogs in South America are dumb; but these bark much in a short thick manner like foxes, and have a surly, savage demeanour like their ancestors, which are not domesticated, but bred up in sties, where they are fed for the table with rice-meal and other farinaceous food. These dogs, having been taken on board as soon as weaned, could not learn much from their dam; yet they did not relish flesh when they came to England. In the islands of the Pacific Ocean the dogs are bred upon vegetables, and would not eat flesh when offered them by our circumnavigators.

We believe that all dogs, in a state of nature, have sharp, upright, fox-like ears, and that hanging ears, which are esteemed so graceful, are the effect of choice breeding and cultivation. Thus, in the "Travels of Ysbrandt Ides from Muscovy to China," the dogs which draw the Tartars on snow-sledges, near the

river Oby, are engraved with prick-ears, like those from Canton. The Kamschatdales also train the same sort of sharp-eared, peak-nosed dogs to draw their sledges, as may be seen in an elegant print engraved for Captain Cook's last voyage round the world.

Now we are upon the subject of dogs, it may not be impertinent to add that spaniels, as all sportsmen know, though they hunt partridges and pheasants as it were by instinct, and with much delight and alacrity, yet will hardly touch their bones when offered as food; nor will a mongrel dog of my own, though he is remarkable for finding that sort of game. But, when we came to offer the bones of partridges to the two Chinese dogs, they devoured them with much greediness, and licked the platter clean.

No sporting dogs will flush woodcocks till inured to the scent and trained to the sport, which they then pursue with vehemence and transport; but then they will not touch their bones, but turn from them with abhorrence, even when they are hungry.

Now, that dogs should not be fond of the bones of such birds as they are not disposed to hunt is no wonder; but why they reject and do not care to eat their natural game is not so easily accounted for, since the end of hunting seems to be that the chase pursued should be eaten. Dogs again will not devour the more

rancid water-fowls, nor indeed the bones of any wild fowls; nor will they touch the fœtid bodies of birds that feed on offal and garbage; and indeed there may be somewhat of providential instinct in this circumstance of dislike, for vultures, and kites, and ravens, and crows, etc., were intended to be messmates with dogs over their carrion, and seem to be appointed by Nature as fellow-scavengers to remove all cadaverous nuisances from the face of the earth.

I am, etc.

LETTER LIX.

THE fossil wood buried in the bogs of Wolmer Forest is not yet all exhausted, for the peat-cutters now and then stumble upon a log. I have just seen a piece which was sent by a labourer of Oak Hanger to a carpenter of this village; this was the butt-end of a small oak, about five feet long, and about five inches in diameter. It had apparently been severed from the ground by an axe, was very ponderous, and as black as ebony. Upon asking the carpenter for what purpose he had procured it, he told me that it was to be sent to his brother, a joiner at Farnham, who was to make use of

it in cabinet-work, by inlaying it along with whiter woods.

Those that are much abroad on evenings after it is dark, in spring and summer, frequently hear a nocturnal bird passing by on the wing, and repeating often a short, quick note. This bird I have remarked myself, but never could make out till lately. I am assured now that it is the stone-curlew (*Charadrius œdicnemus*). Some of them pass over or near my house almost every evening after it is dark, from the uplands of the hill and North Fields, away down towards Dorton, where, among the streams and meadows, they find a greater plenty of food. Birds that fly by night are obliged to be noisy; their notes often repeated become signals or watch-words to keep them together, that they may not stray or lose each the other in the dark.

The evening proceedings and manœuvres of the rooks are curious and amusing in the autumn. Just before dusk they return in long strings from the foraging of the day, and rendezvous by thousands over Selborne Down, where they wheel round in the air, and sport and dive in a playful manner, all the while exerting their voices, and making a loud cawing, which, being blended and softened by the distance that we at the village are below them, becomes a confused noise or

chiding, or rather a pleasing murmur, very engaging to the imagination, and not unlike the cry of a pack of hounds in hollow, echoing woods, or the rushing of the wind in tall trees, or the tumbling of the tide upon a pebbly shore. When this ceremony is over, with the last gleam of day, they retire for the night to the deep beechen woods of Tisted and Ropley. We remember a little girl who, as she was going to bed, used to remark on such an occurrence, in the true spirit of physico-theology, that the rooks were saying their prayers; and yet this child was much too young to be aware that the Scriptures have said of the Deity, that "He feedeth the ravens who call upon Him."

I am, etc.

LETTER LX.

In reading Dr. Huxam's "Observationes de Aëre," etc., written at Plymouth, I find by those curious and accurate remarks, which contain an account of the weather from the year 1727 to the year 1748, inclusive, that though there is frequent rain in that district of Devonshire, yet the quantity falling is not great; and that some years it has been very small: for in 1731 the rain measured only 17·266 in.; and in 1741, 20·354 in.;

and again, in 1743, only 20·908 in. Places near the sea have frequent scuds, that keep the atmosphere moist, yet do not reach far up into the country; making thus the maritime situations appear wet, when the rain is not considerable. In the wettest years at Plymouth the Doctor measured only once 36 in.; and again once, viz., 1734, 37·114 in.—a quantity of rain that has twice been exceeded at Selborne in the short period of my observations. Dr. Huxam remarks that frequent small rains keep the air moist; while heavy ones render it more dry, by beating down the vapours. He is also of opinion that the dingy, smoky appearance in the sky, in very dry seasons, arises from the want of moisture sufficient to let the light through, and render the atmosphere transparent; because he had observed several bodies more diaphanous when wet than dry; and did never recollect that the air had that look in rainy seasons.

My friend, who lives just beyond the top of the down, brought his three swivel guns to try them in my outlet, with their muzzles towards the Hanger, supposing that the report would have had a great effect; but the experiment did not answer his expectation. He then removed them to the alcove on the Hanger, when the sound, rushing along the Lythe and Comb Wood, was very grand; but it was at the hermitage

that the echoes and repercussions delighted the hearers; not only filling the Lythe with the roar, as if all the beeches were tearing up by the roots; but, turning to the left, they pervaded the vale above Comb Wood ponds; and after a pause seemed to take up the crash again, and to extend round Hartley Hangers, and to die away at last among the coppices and coverts of Ward-le-Ham. It has been remarked before that this district is an Anathoth, a place of responses or echoes, and therefore proper for such experiments: we may farther add that the pauses in echoes, when they cease and yet are taken up again, like the pauses in music, surprise the hearers, and have a fine effect on the imagination.

The gentleman above mentioned has just fixed a barometer in his parlour at Newton Valence. The tube was first filled here (at Selborne) twice with care, when the mercury agreed and stood exactly with my own; but, being filled twice again at Newton, the mercury stood, on account of the great elevation of that house, three-tenths of an inch lower than the barometers at this village, and so continues to do, be the weight of the atmosphere what it may. The plate of the barometer at Newton is figured as low as 27; because in stormy weather the mercury there will sometimes descend below 28. We have supposed

Newton House to stand two hundred feet higher than this house: but if the rule holds good, which says that mercury in a barometer sinks one-tenth of an inch for every hundred feet elevation, then the Newton barometer, by standing three-tenths lower than that of Selborne, proves that Newton House must be three hundred feet higher than that in which I am writing, instead of two hundred.

It may not be impertinent to add that the barometers at Selborne stand three-tenths of an inch lower than the barometers at South Lambeth: whence we may conclude that the former place is about three hundred feet higher than the latter; and with good reason, because the streams that rise with us run into the Thames at Weybridge, and so to London. Of course therefore there must be lower ground all the way from Selborne to South Lambeth; the distance between which, all the windings and indentings of the streams considered, cannot be less than a hundred miles.

I am, etc.

LETTER LXI.

SINCE the weather of a district is undoubtedly part of its natural history, I shall make no further apology for the four following letters, which will contain many particulars concerning some of the great frosts, and a few respecting some very hot summers, that have distinguished themselves from the rest during the course of my observations.

As the frost in January 1768 was, for the small time it lasted, the most severe that we had then known for many years, and was remarkably injurious to evergreens, some account of its rigour, and reason of its ravages, may be useful, and not unacceptable to persons that delight in planting and ornamenting; and may particularly become a work that professes never to lose sight of utility.

For the last two or three days of the former year there were considerable falls of snow, which lay deep and uniform on the ground without any drifting, wrapping up the more humble vegetation in perfect security. From the first day to the fifth of the new year more snow succeeded; but from that day the air became entirely clear; and the heat of the sun about

noon had a considerable influence in sheltered situations.

It was in such an aspect that the snow on the author's evergreens was melted every day, and frozen intensely every night; so that the laurustines, bays, laurels, and arbutuses looked, in three or four days, as if they had been burnt in the fire; while a neighbour's plantation of the same kind, in a high cold situation, where the snow was never melted at all, remained uninjured.

From hence I would infer that it is the repeated melting and freezing of the snow that is so fatal to vegetation, rather than the severity of the cold. Therefore it highly behoves every planter, who wishes to escape the cruel mortification of losing in a few days the labour and hopes of years, to bestir himself on such emergencies; and if his plantations are small, to avail himself of mats, cloths, pease-haulm, straw, reeds, or any such covering, for a short time; or, if his shrubberies are extensive, to see that his people go about with prongs and forks, and carefully dislodge the snow from the boughs: since the naked foliage will shift much better for itself, than where the snow is partly melted and frozen again.

It may perhaps appear at first like a paradox; but doubtless the more tender trees and shrubs should never be planted in hot aspects; not only for the

reason assigned above, but also because, thus circumstanced, they are disposed to shoot earlier in the spring, and to grow on later in the autumn than they would otherwise do, and so are sufferers by lagging or early frosts. For this reason also plants from Siberia will hardly endure our climate; because, on the very first advances of spring, they shoot away, and so are cut off by the severe nights of March or April.

Dr. Fothergill and others have experienced the same inconvenience with respect to the more tender shrubs from North America, which they therefore plant under north walls. There should also perhaps be a wall to the east to defend them from the piercing blasts from that quarter.

This observation might without any impropriety be carried into animal life; for discerning bee-masters now find that their hives should not in the winter be exposed to the hot sun, because such unseasonable warmth awakens the inhabitants too early from their slumbers; and, by putting their juices into motion too soon, subjects them afterwards to inconveniences when rigorous weather returns.

The coincidents attending this short but intense frost were, that the horses fell sick with an epidemic distemper, which injured the winds of many, and killed some; that colds and coughs were general among the

human species; that it froze under people's beds for several nights; that meat was so hard frozen that it could not be spitted, and could not be secured but in cellars; that several red-wings and thrushes were killed by the frost; and that the large titmouse continued to pull straws lengthwise from the eaves of thatched houses and barns in a most adroit manner, for a purpose that has been explained already.

On the 3rd January, Benjamin Martin's thermometer within doors, in a close parlour where there was no fire, fell in the night to 20°, and on the 4th, to 18°, and on the 7th, to 17½°, a degree of cold which the owner never since saw in the same situation; and he regrets much that he was not able at that juncture to attend his instrument abroad. All this time the wind continued north and north-east; and yet on the 8th roost-cocks, which had been silent, began to sound their clarions, and crows to clamour, as prognostic of milder weather; and, moreover, moles began to heave and work, and a manifest thaw took place. From the latter circumstance we may conclude that thaws often originate under ground from warm vapours which arise; else how should subterraneous animals receive such early intimations of their approach? Moreover, we have often observed that cold seems to descend from above; for, when a thermometer hangs abroad in a

frosty night, the intervention of a cloud shall immediately raise the mercury 10°; and a clear sky shall again compel it to descend to its former gauge.

And here it may be proper to observe, on what has been said above, that though frosts advance to their utmost severity by somewhat of a regular gradation, yet thaws do not usually come on by as regular a declension of cold; but often take place immediately from intense freezing; as men in sickness often mend at once from a paroxysm.

To the great credit of Portugal laurels and American junipers, be it remembered that they remained untouched amidst the general havoc: hence men should learn to ornament chiefly with such trees as are able to withstand accidental severities, and not subject themselves to the vexation of a loss which may befall them once perhaps in ten years, yet may hardly be recovered through the whole course of their lives.

As it appeared afterwards, the ilexes were much injured, the cypresses were half destroyed, the arbutuses lingered on, but never recovered; and the bays, laurustines, and laurels, were killed to the ground; and the very wild hollies, in hot aspects, were so much affected that they cast all their leaves.

By the 14th January the snow was entirely gone; the turnips emerged not damaged at all, save in sunny

places; the wheat looked delicately, and the garden plants were well preserved; for snow is the most kindly mantle that infant vegetation can be wrapped in: were it not for that friendly meteor no vegetable life could exist at all in northerly regions. Yet in Sweden the earth in April is not divested of snow for more than a fortnight before the face of the country is covered with flowers.

LETTER LXII.

THERE were some circumstances attending the remarkable frost in January 1776, so singular and striking, that a short detail of them may not be unacceptable.

The most certain way to be exact will be to copy the passages from my journal, which were taken from time to time, as things occurred. But it may be proper previously to remark that the first week in January was uncommonly wet, and drowned with vast rains from every quarter; from whence may be inferred, as there is great reason to believe is the case, that intense frosts seldom take place till the earth is

perfectly glutted and chilled with water; and hence dry autumns are seldom followed by rigorous winters.

January 7th.—Snow driving all the day, which was followed by frost, sleet, and some snow, till the 12th, when a prodigious mass overwhelmed all the works of men, drifting over the tops of the gates, and filling the hollow lanes.

On the 14th the writer was obliged to be much abroad; and thinks he never before or since has encountered such rugged Siberian weather. Many of the narrow roads were now filled above the tops of the hedges, through which the snow was driven into most romantic and grotesque shapes, so striking to the imagination as not to be seen without wonder and pleasure. The poultry dared not to stir out of their roosting places; for cocks and hens are so dazzled and confounded by the glare of snow that they would soon perish without assistance. The hares also lay sullenly in their seats, and would not move till compelled by hunger, being conscious—poor animals—that the drifts and heaps treacherously betray their footsteps, and prove fatal to numbers of them.

From the 14th the snow continued to increase, and began to stop the road waggons, and coaches, which could no longer keep on their regular stages; and especially on the western roads, where the fall appears

to have been deeper than in the south. The company at Bath, that wanted to attend the Queen's birthday, were strangely incommoded: many carriages of persons who got in their way to town from Bath as far as Marlborough, after strange embarrassments, here met with a *ne plus ultra*. The ladies fretted, and offered large rewards to labourers if they would shovel them a track to London; but the relentless heaps of snow were too bulky to be removed; and so the 18th passed over, leaving the company in very uncomfortable circumstances at the Castle and other inns.

On the 20th the sun shone out for the first time since the frost began; a circumstance that has been remarked before much in favour of vegetation. All this time the cold was not very intense, for the thermometer stood at 29°, 28°, 25°, and thereabout; but on the 21st it descended to 20°. The birds now began to be in a very pitiable and starving condition. Tamed by the season, sky-larks settled in the streets of towns, because they saw the ground was bare; rooks frequented dunghills close to houses; and crows watched horses as they passed, and greedily devoured what dropped from them. Hares now came into men's gardens, and, scraping away the snow, devoured such plants as they could find.

On the 22nd the author had occasion to go to

London through a sort of Laplandian scene, very wild and grotesque indeed. But the metropolis itself exhibited a still more singular appearance than the country; for, being bedded deep in snow, the pavement of the streets could not be touched by the wheels or the horse's feet, so that the carriages ran about without the least noise. Such an exemption from din and clatter was strange, but not pleasant; it seemed to convey an uncomfortable idea of desolation:—

"——Ipsa silentia terrent."

On the 27th much snow fell all day, and in the evening the frost became very intense. At South Lambeth, for the four following nights, the thermometer fell to 11°, 7°, 6°, 6°; and at Selborne to 7°, 6°, 10°; and on the 31st January, just before sunrise, with rime on the trees and on the tube of the glass, the quicksilver sank exactly to zero, being 32° below the freezing point; but by eleven in the morning, though in the shade, it sprang up to 16½°,—a most unusual degree of cold this for the south of England! During these four nights the cold was so penetrating that it occasioned ice in warm chambers and under beds; and in the day the wind was so keen that persons of robust constitutions could scarcely endure to face it. The Thames was at once so frozen over,

both above and below bridge, that crowds ran about on the ice. The streets were now strangely encumbered with snow, which crumbled and trod dusty, and, turning grey, resembled bay-salt; what had fallen on the roofs was so perfectly dry that, from first to last, it lay twenty-six days on the houses in the city—a longer time than had been remembered by the oldest housekeepers living. According to all appearances we might now have expected the continuance of this rigorous weather for weeks to come, since every night increased in severity; but behold, without any apparent cause, on the 1st February a thaw took place, and some rain followed before night, making good the observation above, that frosts often go off as it were at once, without any gradual declension of cold. On the 2nd February the thaw persisted; and on the 3rd swarms of little insects were frisking and sporting in a courtyard at South Lambeth, as if they had felt no frost. Why the juices in the small bodies and smaller limbs of such minute beings are not frozen is a matter of curious inquiry.

Severe frosts seem to be partial, or to run in currents, for at the same juncture, as the author was informed by accurate correspondents, at Lyndon, in the county of Rutland, the thermometer stood at 19°; at Blackburn, in Lancashire, at 19°; and at

Manchester, at 21°, 20°, and 18°. Thus does some unknown circumstance strangely overbalance latitude, and render the cold sometimes much greater in the southern than the northern parts of this kingdom.

The consequences of this severity were that in Hampshire, at the melting of the snow, the wheat looked well, and the turnips came forth little injured. The laurels and laurustines were somewhat damaged, but only in hot aspects. No evergreens were quite destroyed, and not half the damage sustained that befell in January 1768. Those laurels that were a little scorched on the south sides were perfectly untouched on their north sides. The care taken to shake the snow day by day from the branches seemed greatly to avail the author's evergreens. A neighbour's laurel-hedge, in a high situation, and facing to the north, was perfectly green and vigorous, and the Portugal laurels remained unhurt.

As to the birds, the thrushes and blackbirds were mostly destroyed; and the partridges, by the weather and poachers, were so thinned that few remained to breed the following year.

LETTER LXIII.

As the frost in December 1784 was very extraordinary, you, I trust, will not be displeased to hear the particulars, and especially when I promise to say no more about the severities of winter after I have finished this letter.

The first week in December was very wet, with the barometer very low. On the 7th, with the barometer at 28·5°—came on a vast snow, which continued all that day and the next, and most part of the following night; so that by the morning of the 9th the works of men were quite overwhelmed, the lanes filled so as to be impassable, and the ground covered twelve or fifteen inches without any drifting. In the evening of the 9th, the air began to be so very sharp that we thought it would be curious to attend to the motions of a thermometer; we therefore hung out two, one made by Martin and one by Dollond, which soon began to show us what we were to expect; for by ten o'clock they fell to 21°, and at eleven to 4°, when we went to bed. On the 10th, in the morning, the quicksilver of Dollond's glass was down to half a degree below zero; and that of Martin's, which was absurdly graduated

only to four degrees above zero, sank quite into the brass guard of the ball; so that when the weather became most interesting this was useless. On the 10th, at eleven at night, though the air was perfectly still, Dolland's glass went down to one degree below zero! This strange severity of the weather made me very desirous to know what degree of cold there might be in such an exalted and near situation as Newton. We had, therefore, on the morning of the 10th, written to Mr.——, and entreated him to hang out his thermometer, made by Adams, and to pay some attention to it morning and evening, expecting wonderful phenomena, in so elevated a region, at two hundred feet or more above my house. But, behold! on the 10th, at eleven at night, it was down only to 17°, and the next morning at 22°, when mine was at 10°! We were so disturbed at this unexpected reverse of comparative local cold, that we sent one of my glasses up, thinking that of Mr.——— must, somehow, be wrongly constructed. But, when the instruments came to be confronted, they went exactly together; so that, for one night at least, the cold at Newton was 18° less than at Selborne; and, through the whole frost, 10° or 12°; and, indeed, when we came to observe consequences, we could readily credit this; for all my laurustines, bays, ilexes, arbutuses, cypresses, and even my Portugal laurels,

and (which occasions more regret) my fine sloping laurel-hedge, were scorched up; while, at Newton, the same trees have not lost a leaf.

We had steady frost on the 25th, when the thermometer in the morning was down to 10° with us, and at Newton only to 21°. Strong frost continued till the 31st, when some tendency to thaw was observed; and, by January 3rd, 1785, the thaw was confirmed, and some rain fell.

A circumstance that I must not omit, because it was new to us, is, that on Friday, December 10th, being bright sunshine, the air was full of icy *spiculæ*, floating in all directions, like atoms in a sunbeam let into a dark room. We thought them at first particles of the rime falling from my tall hedges; but were soon convinced to the contrary, by making our observations in open places where no rime could reach us. Were they watery particles of the air frozen as they floated, or were they evaporations from the snow frozen as they mounted?

We were much obliged to the thermometers for the early information they gave us; and hurried our apples, pears, onions, potatoes, etc., into the cellar, and warm closets; while those who had not, or neglected such warnings, lost all their store of roots and fruits, and had their very bread and cheese frozen.

I must not omit to tell you that, during these two Siberian days, my parlour cat was so electric, that had a person stroked her, and been properly insulated, the shock might have been given to a whole circle of people.

I forgot to mention before, that, during the two severe days, two men, who were tracing hares in the snow, had their feet frozen, and two men, who were much better employed, had their fingers so affected by the frost, while they were thrashing in a barn, that a mortification followed, from which they did not recover for many weeks.

This frost killed all the furze and most of the ivy, and in many places stripped the hollies of all their leaves. It came at a very early time of the year, before old November ended; and yet may be allowed from its effects to have exceeded any since 1730-40.

LETTER LXIV.

As the effects of heat are seldom very remarkable in the northerly climate of England, where the summers are often so defective in warmth and sunshine as not to ripen the fruits of the earth so well as might be wished, I shall be more concise in my account of the severity of a summer season, and so make a little amends for the prolix account of the degrees of cold, and the inconveniences that we suffered from some late rigorous winters.

The summers of 1781 and 1783 were unusually hot and dry; to them therefore I shall turn back in my journals, without recurring to any more distant period. In the former of these years my peach and nectarine-trees suffered so much from the heat that the rind on the bodies was scalded and came off; since which the trees have been in a decaying state. This may prove a hint to assiduous gardeners to fence and shelter their wall-trees with mats or boards, as they may easily do, because such annoyance is seldom of long continuance. During that summer also, I observed that my apples were coddled, as it were, on the trees; so that they had no quickness of flavour, and would not keep in the

winter. This circumstance put me in mind of what I have heard travellers assert, that they never ate a good apple or apricot in the south of Europe, where the heats were so great as to render the juices vapid and insipid.

The great pests of a garden are wasps, which destroy all the finer fruits just as they are coming into perfection. In 1781 we had none; in 1783 there were myriads, which would have devoured all the produce of my garden, had not we set the boys to take the nests, and caught thousands with hazel-twigs tipped with bird-lime: we have since employed the boys to take and destroy the large breeding wasps in the spring. Such expedients have a great effect on these marauders, and will keep them under. Though wasps do not abound but in hot summers, yet they do not prevail in every hot summer, as I have instanced in the two years above mentioned.

In the sultry season of 1783, honey-dews were so frequent as to deface and destroy the beauties of my garden. My honeysuckles, which were one week the most sweet and lovely objects that the eye could behold, became the next the most loathsome; being enveloped in a viscous substance, and loaded with black aphides, or smother-flies. The occasion of this clammy appearance seems to be this, that in hot weather the effluvia

of flowers in fields and meadows and gardens are drawn up in the day by a brisk evaporation, and then in the night fall down again with the dews, in which they are entangled; that the air is strongly scented, and therefore impregnated with the particles of flowers in summer weather, our senses will inform us; and that this clammy sweet substance is of the vegetable kind we may learn from bees, to whom it is very grateful: and we may be assured that it falls in the night, because it is always first seen in warm still mornings.

On chalky and sandy soils, and in the hot villages about London, the thermometer has been often observed to mount as high as 83° or 84°; but with us, in this hilly and woody district, I have hardly ever seen it exceed 80°, nor does it often arrive at that pitch. The reason, I conclude, is, that our dense clayey soil, so much shaded by trees, is not so easily heated through as those above-mentioned; and, besides, our mountains cause currents of air and breezes; and the vast effluvia from our woodlands temper and moderate our heats.

LETTER LXV.

THE summer of the year 1783 was an amazing and portentous one, and full of horrible phenomena; for, besides the alarming meteors and tremendous thunder-storms that affrighted and distressed the different counties of this kingdom, the peculiar haze, or smoky fog, that prevailed for many weeks in this island, and in every part of Europe, and even beyond its limits, was a most extraordinary appearance, unlike anything known within the memory of man. By my journal I find that I had noticed this strange occurrence from June 23rd to July 20th inclusive, during which period the wind varied to every quarter without making any alteration in the air. The sun, at noon, looked as blank as a clouded moon, and shed a rust-coloured ferruginous light on the ground, and floors of rooms; but was particularly lurid and blood-coloured at rising and setting. All the time the heat was so intense that butchers' meat could hardly be eaten on the day after it was killed; and the flies swarmed so in the lanes and hedges that they rendered the horses half frantic, and riding irksome. The country people began to look with a superstitious awe at the red, louring aspect of

the sun; and indeed there was reason for the most enlightened person to be apprehensive; for, all the while, Calabria and part of the isle of Sicily were torn and convulsed with earthquakes; and about that juncture a volcano sprang out of the sea on the coast of Norway. On this occasion Milton's noble simile of the sun, in his first book of "Paradise Lost," frequently occurred to my mind; and it is indeed particularly applicable, because, towards the end, it alludes to a superstitious kind of dread, with which the minds of men are always impressed by such strange and unusual phenomena.

"—— As when the *sun*, new risen,
Looks through the horizontal, *misty* air,
Shorn of his *beams;* or from behind the moon,
In *dim* eclipse, *disastrous twilight sheds*
On half the nations, and with *fear* of *change*
Perplexes monarchs——."

LETTER LXVI.

We are very seldom annoyed with thunderstorms: and it is no less remarkable than true, that those which arise in the south have hardly been known to reach this village; for, before they get over us, they take a direction to the east or to the west, or sometimes divide in two, go in part to one of those quarters, and in part to the other; as was truly the case in summer 1783, when, though the country round was continually harassed with tempests, and often from the south, yet we escaped them all, as appears by my journal of that summer. The only way that I can at all account for this fact—for such it is—is that, on that quarter, between us and the sea, there are continual mountains, hill behind hill, such as Nore-hill, the Barnet, Butser-hill, and Ports-down, which somehow divert the storms, and give them a different direction. High promontories, and elevated grounds, have always been observed to attract clouds and disarm them of their mischievous contents, which are discharged into the trees and summits as soon as they come in contact with those turbulent meteors; while the humble vales escape, because they are so far beneath them.

But, when I say I do not remember a thunderstorm from the south, I do not mean that we never have suffered from thunderstorms at all; for on June 5th, 1784, the thermometer in the morning being at 64°, and at noon at 70° the barometer at 29·6½° and the wind north, I observed a blue mist, smelling strongly of sulphur, hanging along our sloping woods, and seeming to indicate that thunder was at hand. I was called in about two in the afternoon, and so missed seeing the gathering of the clouds in the north; which they who were abroad assured me had something uncommon in its appearance. At about a quarter after two the storm began in the parish of Hartley, moving slowly from north to south: and from thence it came over Norton-farm, and so to Grange-farm, both in this parish. It began with vast drops of rain, which were soon succeeded by round hail, and then by convex pieces of ice, which measured three inches in girth. Had it been as extensive as it was violent, and of any continuance (for it was very short), it must have ravaged all the neighbourhood. In the parish of Hartley it did some damage to one farm; but Norton, which lay in the centre of the storm, was greatly injured; as was Grange, which lay next to it. It did but just reach to the middle of the village, where the hail broke my north windows, and all my garden-lights and hand-glasses,

and many of my neighbours' windows. The extent of the storm was about two miles in length and one in breadth. We were just sitting down to dinner; but were soon diverted from our repast by the clattering of tiles and the jingling of glass. There fell at the same time prodigious torrents of rain on the farms above mentioned, which occasioned a flood as violent as it was sudden; doing great damage to the meadows and fallows, by deluging the one and washing away the soil of the other. The hollow lane towards Alton was so torn and disordered as not to be passable till mended, rocks being removed that weighed two hundred-weight. Those that saw the effect which the great hail had on ponds and pools say that the dashing of the water made an extraordinary appearance, the froth and spray standing up in the air three feet above the surface. The rushing and roaring of the hail as it approached, was truly tremendous.

Though the clouds at South Lambeth, near London, were at that juncture thin and light, and no storm was in sight, nor within hearing, yet the air was strongly electric; for the bells of an electric machine at that place rang repeatedly, and fierce sparks were discharged.

When I first took the present work in hand I proposed to have added an "*Annus Historico-naturalis*, or The Natural History of the Twelve Months of the

Year;" which would have comprised many incidents and occurrences that have not fallen in my way to be mentioned in my series of letters; but, as Mr. Aikin of Warrington has lately published somewhat of this sort, and as the length of my correspondence has sufficiently put your patience to the test, I shall here take a respectful leave of you and natural history together, and am,

With all due deference and regard,

Your most obliged and most humble servant,

GIL. WHITE.

THE END.

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